Health Science

Career Cluster Resources for Health Science

www.careerclusters.org

Table of Contents

Introduction

Section I – Pathway Model

Section II – Cluster Knowledge and Skills

Section III – Pathway Knowledge and Skills

Section IV – O*NET Crosswalk Report

Section V – Cluster Profile and Advisory Committee

Section VI – Credentials

Section VII – Validation Overview/ Results

Section VIII – Assessment Protocol
Certification Protocol

Introduction

The States' Career Cluster Initiative

9/01/02

Charles Losh, Ph.D., Project Director

The U.S. Department of Education Office of Vocational and Adult Education (OVAE) has identified 16 career clusters representing career opportunities for the 21st century economy. These clusters will frame student opportunities as they pursue postsecondary education and a wide range of career opportunities from front-line to professional and managerial careers.

Helping students make their dreams become a reality was the driving force behind the nation's Career Clusters initiative launched June 1, 2001. Twelve lead states and the District of Columbia were partners in the development of the tools supporting eleven career clusters which, when combined with the five clusters that have already been developed, will represent all career possibilities.

The National Association of State Directors for Career and Technical Education Consortium (NASDCTEc) and their Board of Directors assumed leadership for coordinating the project. This in itself was unique for a project of this scope. The Board and the State Directors organization believed that this initiative was of such potential impact on the Career Technical delivery system in the country that they needed to play this leadership role in the project, assuring that the materials had utility in their states once completed. Therefore, the NASDCTEc in conjunction with the State of Oklahoma (the project fiscal agent) prepared and submitted a proposal to OVAE in January of 2001. This proposal was funded at a $2.2 million dollar level, with expectations of a second year of funding of $2.5 million. The plan to develop eleven curriculum frameworks was very aggressive, given that each of the prior projects, designed to develop and pilot test materials for a single cluster, had received in excess of $1 million dollars for their multiyear development work.

The project was designed to establish curriculum frameworks and supportive materials for each cluster, with a broad-based advisory committee for each cluster, led by a state. There was also a National Advisory Committee consisting of members from each of the cluster committees, along with other stakeholders. The National and State Cluster advisory committees were responsible for identifying the frameworks, pathway and foundation knowledge and skills, and other supportive

materials. The committees included representatives from states, schools, education and training, business and industry, associations, and others directly impacted by the materials.

The development of materials for each of the eleven clusters was led by a different state, with business and industry at the helm. The lead states included: Idaho and Iowa (jointly leading the Agriculture, Food and Natural Resources cluster), Pennsylvania (Architecture and Construction), Ohio (Marketing, Sales and Service), North Dakota (Finance), West Virginia (Hospitality and Tourism), South Carolina (Business, Management and Administration), Kentucky (Human Services), Arkansas (Law, Public Safety and Security), North Carolina (Science, Technology, Engineering and Mathematics), Michigan (Education and Training), and Oklahoma and the District of Columbia/Washington D.C. (jointly leading the Government and Public Administration cluster).

The five additional career clusters included Health Science led by the State of Utah, Manufacturing led by the State of Indiana, Arts, Audio Video Technology and Communications led by the V-TECS Consortium, Information Technology led by the Educational Development Center, Inc., and Transportation, Distribution and Logistics Cluster led by the State of Illinois. These clusters plan to complete their work by June 30 of 2003.

To facilitate and coordinate the developmental work of the Cluster Initiative, staff was identified and housed at the Oklahoma Department of Career and Technical Education. The staff consisted of four Cluster Coordinators: Marsha Daves, Greg Dewald, Curtis Shumaker, and Pam Stacey. Additionally, Denise Christy provided research and web development support, Lisa Batchelder provided financial support, and Karan Smith provided administrative support.

Development work for the States' Career Clusters Initiative began June 1, 2001, and the first meeting of lead states, OVAE staff, and cluster staff was held in Oklahoma City in mid-June. At this meeting, project objectives, general direction, timelines, and the initial research goals were identified. This work continued through the fall and winter of 2001 and included the identification of cluster advisory committee members, the development of cluster frameworks based on the prototype cluster models provided by V-TECS, and the identification of occupations and draft pathways along with degrees and certificates associated with the career specialties/occupations in each of the clusters.

In January of 2002, the lead state teams were brought together in Phoenix to begin the process of developing knowledge and skill statements for each of the cluster pathways and foundations. Contracted writers and lead state cluster advisory committee members, depending upon

the decisions of cluster leadership, carried out this work. A part-time editor in Oklahoma provided consistency across the cluster knowledge and skill statements. One concern that was addressed early in the process was the need for a "common look and feel" across the clusters. Ultimately, this was accomplished not only for the eleven clusters in the States' Career Clusters Initiative, but also through close cooperative relationships between the projects, all the cluster knowledge and skill statements were developed (or retro-fitted) using the same format. This format includes a knowledge/skill statement with associated performance elements and measurement criteria. This format provides the tools needed for curriculum and assessment developers as they take the materials to the classroom.

The National Advisory Committee met in March of 2002, and reviewed the curriculum frameworks, credentials list, and lead state advisory committee memberships and structures, and forwarded those materials to the Executive Committee for the Project. The Executive Committee, made up of the Board of the NASDCTEc, also met in March, approved the materials and discussed the future actions needed to assure implementation of the cluster materials.

Originally, the project was designed for a minimum of two years and was to include the identification of 110 pilot test sites across the country, along with the development of assessments and certifications for the clusters. The Office of Vocational and Adult Education, however, determined in November of 2001 that the goals of the project were "too broad", and terminated the project as of September 30, 2002.

Development of the products needed for curriculum and assessment was fast-tracked, with the knowledge and skill statements, performance elements and measurement criteria ready for validation by July 15, 2002. This was the result of a major effort of lead state advisory committees and staff responding to the shortened timeline and the need for quality product.

Given the efforts of the developmental teams, cluster advisory committee members were able to review and validate the knowledge and skills and supporting elements. Additionally, a national web-based validation was conducted from July 15 to August 15, 2002. All 50 states were invited to a dissemination meeting held in Charleston, South Carolina Sept 13, 2002, where the materials were distributed to participants for their use in updating their curriculum.

For further information on the status of the materials, go to the web-site, http://www.careerclusters.org/.

Section I – Pathway Model

Health Science Career Cluster

Planning, managing, and providing therapeutic services, diagnostic services, health informatics, support services, and biotechnology research and development.

Sample Career Specialties/Occupations	♦ Acupuncturist ♦ Anesthesiologist Assistant ♦ Art / Music / Dance Therapist(s) ♦ Athletic Trainer ♦ Audiologist ♦ Certified Nursing Assistant ♦ Chiropractor ♦ Dental Assistant / Hygienist ♦ Dental Lab Technician ♦ Dentist ♦ Dietician ♦ Dosimetrist ♦ EMT ♦ Exercise Physiologist ♦ Home Health Aide ♦ Kinesiotherapist ♦ Licensed Practical Nurse ♦ Massage Therapist ♦ Medical Assistant ♦ Mortician ♦ Occupational Therapist / Asst ♦ Ophthalmic Medical Personnel ♦ Optometrist ♦ Orthotist/Prosthetist ♦ Paramedic ♦ Pharmacist/Pharmacy Tech ♦ Physical Therapist / Assistant ♦ Physician (MD/DO) ♦ Physician's Assistant ♦ Psychologist ♦ Recreation Therapist ♦ Registered Nurse ♦ Respiratory Therapist ♦ Social Worker ♦ Speech Language Pathologist ♦ Surgical Technician ♦ Veterinarian / Vet Tech	♦ Cardiovascular Technologist ♦ Clinical Lab Technician ♦ Computer Tomography (CT) Technologist ♦ Cytogenetic Technologist ♦ Cytotechnologists ♦ Diagnostic Medical Sonographers ♦ Electrocardiographic (ECG) Technician ♦ Electronic Diagnostic (EEG) Technologist ♦ Exercise Physiologist ♦ Geneticist ♦ Histotechnician ♦ Histotechnologist ♦ Magnetic Resonance (MR) Technologist ♦ Mammographer ♦ Medical Technologist / Clinical Laboratory Scientist ♦ Nuclear Medicine Technologist ♦ Nutritionist ♦ Pathologist ♦ Pathology Assistant ♦ Phlebotomist ♦ Positron Emission Tomography (PET) Technologist ♦ RadiologicTechnologist/Radiographer ♦ Radiologist	♦ Admitting Clerk ♦ Applied Researcher ♦ Community Services Specialists ♦ Data Analyst ♦ Epidemiologist (SHSMD Stratsocieety.org) ♦ Ethicist ♦ Health Educator ♦ Health Information Coder ♦ Health Information Services ♦ Healthcare Administrator ♦ Medical Assistant ♦ Medical Biller/Patient Financial Services ♦ Medical Information Technologist ♦ Medical Librarian/Cybrarian ♦ Patient Advocates ♦ Public Health Educator ♦ Reimbursement Specialist (HFMA) ♦ Risk Management ♦ Social Worker ♦ Transcriptionist ♦ Unit Coordinator ♦ Utilization Manager	♦ Biomedical / Clinical Engineer ♦ Biomedical / Clinical Technician ♦ Central Services ♦ Environmental Health and Safety ♦ Environmental Services ♦ Facilities Manager ♦ Food Service ♦ Hospital Maintenance Engineer ♦ Industrial Hygienist ♦ Materials Management ♦ Transport Technician	♦ Biochemist ♦ Bioinformatics Associate ♦ Bioinformatics Scientist ♦ Bioinformatics Specialist ♦ Biomedical Chemist ♦ Biostatistician ♦ Cell Biologist ♦ Clinical Trials Research Associate ♦ Clinical Trials Research Coordinator ♦ Geneticist ♦ Lab Assistant-Genetics ♦ Lab Technician ♦ Microbiologist ♦ Molecular Biologist ♦ Pharmaceutical Scientist ♦ Quality Assurance Technician ♦ Quality Control Technician ♦ Regulatory Affairs Specialist ♦ Research Assistant ♦ Research Associate ♦ Research Scientist ♦ Toxicologist
Pathways	**Therapeutic Services**	**Diagnostics Services**	**Health Informatics**	**Support Services**	**Biotechnology Research and Development**
Cluster K & S	**Cluster Knowledge and Skills** ♦ Academic Foundation ♦ Communications ♦ Systems ♦ Employability Skills ♦ Legal Responsibilities♦ Ethics ♦ Safety Practices ♦ Teamwork♦ Health Maintenance Practices ♦ Technical Skills♦ Information Technology Applications				

Section II – Cluster Knowledge and Skills

Health Care Foundation Standards:
Eleven standards comprise the Health Care Foundation Standards category of the National Health Care Skill Standards. Prior to entering the health care workforce or entering into postsecondary preparation, learners will be proficient in the foundation standards. They are as follows:

1 Academic Foundation
Health care workers will know the academic subject matter required for proficiency within their area. They will use this knowledge as needed in their role.

2 Communications
Health care workers will know the various methods of giving and obtaining information. They will communicate effectively, both orally and in writing.

3 Systems
Health care workers will understand how their role fits into their department, their organizations, and the overall health care environment. They will identify how key systems affect services they perform and quality of care.

4 Employability Skills
Health care workers will understand how employability skills enhance their employment opportunities and job satisfaction. They will demonstrate key employability skills and will maintain and upgrade skills, as needed.

5 Legal Responsibilities
Health care workers will understand their legal responsibilities, limitations and implications of their actions within the health care delivery setting. They will perform their duties according to regulations, policies, laws and legislated rights of clients.

6 Ethics
Health care workers will understand accepted ethical practices with respect to cultural, social and ethnic differences within the health care environment. They will perform quality health care delivery.

7 Safety Practices
Health care workers will understand the existing and potential hazards to clients, co-workers and self. They will prevent injury or illness through safe work practices and follow health and safety policies and procedures.

8 Teamwork
Health care workers will understand the roles and responsibilities of individual members as part of a health care team, including their ability to promote the delivery of quality health care. They will interact effectively and sensitively with all members of the health care team.

9 Health Maintenance Practices
Health care workers will understand the fundamentals of wellness and the prevention of disease processes. They will practice preventive health behaviors among clients.

10 Technical Skills
Health care workers will apply technical skills required for all career specialties. They will demonstrate skills and knowledge as appropriate.

11 Information Technology Skills
Health care workers will use information technology applications required within all career specialties. They will demonstrate use as appropriate to health care applications.

Cluster Knowledge and Skill Statement

Academic Foundations

Statement: Health care workers will know the academic subject matter required for proficiency within their area. They will use this knowledge as needed in their role. In additions to state high school graduation requirements, the following are included:

Performance Element: Use a knowledge of human structure and function.

Measurement Criteria: *Describe the basic structures and functions of cells, tissues, organs, and systems as they relate to home ostasis.*

Measurement Criteria: *Compare relationships among cells, tissues, organs, and systems.*

Measurement Criteria: *Explain body planes, directional terms, quadrants, and cavities.*

Measurement Criteria: *Analyze the interdependence of the body systems as they relate to wellness, disease, disorders, therapies, and care rehabilitation.*

Performance Element: Use a knowledge of diseases and disorders.

Measurement Criteria: *Compare selected diseases/disorders including respective classification(s), causes, diagnoses, therapies, and care/rehabilitation to include biotechnological applications.*

Measurement Criteria: *Analyze methods to control the spread of pathogenic microorganisms.*

Measurement Criteria: *Contrast various types of immunities.*

Measurement Criteria: *Analyze body system changes in light of diseases, disorders and wellness.*

Measurement Criteria: *Compare the aging process among the body systems.*

Cluster Knowledge and Skill Statement

Communications

Statement: Health care workers will know the various methods of giving and obtaining information. They will communicate effectively, both orally and in writing.

Performance Element: Use Communication Skills.

- ***Measurement Criteria:*** *Adjust communication to other's ability to understand.*
- ***Measurement Criteria:*** *Apply the elements of communication using the sender-receiver model.*
- ***Measurement Criteria:*** *Apply active listening skills using reflection, restatement, and clarification techniques.*
- ***Measurement Criteria:*** *Demonstrate courtesy to others including self-introduction.*
- ***Measurement Criteria:*** *Interpret verbal and non-verbal behaviors to augment communication and within scope of practice.*
- ***Measurement Criteria:*** *Demonstrate interviewing skills.*

Performance Element: Demonstrate written communication skills.

- ***Measurement Criteria:*** *Report relevant information in order of occurrence.*
- ***Measurement Criteria:*** *Report subjective information.*
- ***Measurement Criteria:*** *Report objective information.*
- ***Measurement Criteria:*** *Analyze communications for appropriate response and provide feedback.*
- ***Measurement Criteria:*** *Organize, write and compile technical information and summaries.*
- ***Measurement Criteria:*** *Use medical terminology within a scope of practice in order to interpret, transcribe and communicate information, data and observations.*

Cluster Knowledge and Skill Statement

Information Technology Applications

Statement: Health care workers will use information technology applications required within all career specialties. They will demonstrate use as appropriate to health care applications.

Performance Element: Utilize Communication Technology.

Measurement Criteria: *Organize records and files to maintain data as required.*

Measurement Criteria: *Use communication technology (Fax, E-mail, Internet) to access and distribute date and other information.*

Cluster Knowledge and Skill Statement

Systems

Statement: Health care workers will understand how their role fits into their department, their organization and the overall health care environment. They will identify how key systems affect services they perform and quality of care.

Performance Element: Understand Systems Theory.

Measurement Criteria: *Describe systems theory and its' components.*

Measurement Criteria: *Construct a general systems model using inputs, throughputs, and a feedback loop.*

Performance Element: Understand the Health Care Delivery System.

Measurement Criteria: *Construct a healthcare delivery system model.*

Measurement Criteria: *Predict where and how factors such as cost, managed care, technology, an aging population, access to care, alternative therapies, and lifestyle/behavior changes may affect various health care delivery system models.*

Measurement Criteria: *Project outcomes as interconnected components of a modified health care system.*

Measurement Criteria: *Calculate the cost effectiveness of two separate health care delivery systems using the same client procedure.*

Performance Element: Describe Health Care Delivery System Results.

Measurement Criteria: *Diagram the interdependence of health care professions within a given health care delivery system and pertaining to the delivery of quality health care.*

Measurement Criteria: *Design a system analysis process that evaluates the following outcomes; client satisfaction, productivity, cost effectiveness, and efficiency.*

Measurement Criteria: *Evaluate the impact of enhanced technology on the health care delivery system.*

Performance Element: Understand System Change.

Measurement Criteria: *Analyze the cause and effect on health care system change based on the influence of: technology, epidemiology, bio-ethics, socio-economics, and various forms of complimentary (non-traditional) medicine.*

Cluster Knowledge and Skill Statement

Safety, Health, and Environmental

Statement: Health care workers will understand the existing and potential hazards to clients, co-workers, and self. They will prevent injury or illness through safe work practices and follow health and safety policies and procedures.

Performance Element: Understand infection control.

- ***Measurement Criteria:*** *Practice infection control procedures.*
- ***Measurement Criteria:*** *Practice appropriate cleaning, disinfecting, and sterilizing processes.*
- ***Measurement Criteria:*** *Contrast medical and surgical asepsis.*

Performance Element: Employ personal safety practices.

- ***Measurement Criteria:*** *Manage a personal exposure incident in compliance with OSHA regulations.*
- ***Measurement Criteria:*** *Apply principles of body mechanics and ergonomics.*
- ***Measurement Criteria:*** *Use personal protective equipment as appropriate to the environment.*

Performance Element: Use techniques to insure environmental safety.

- ***Measurement Criteria:*** *Modify the environment to create safe working conditions.*
- ***Measurement Criteria:*** *Demonstrate methods of fire prevention in the health care setting.*
- ***Measurement Criteria:*** *Prevent accidents by using proper safety techniques.*
- ***Measurement Criteria:*** *Practice good housekeeping by maintaining a safe work environment.*

Performance Element: Identify common safety hazards.

- ***Measurement Criteria:*** *Use Materials Safety Data Sheets (MSDS).*
- ***Measurement Criteria:*** *Adhere to hazardous labeling requirements.*
- ***Measurement Criteria:*** *Comply with safety signs, symbols, and labels.*
- ***Measurement Criteria:*** *Take appropriate action when observing a hazardous material problem.*
- ***Measurement Criteria:*** *Apply safety principles within given environment.*
- ***Measurement Criteria:*** *Handle hazardous chemicals commonly used in the health care environment in an appropriate manner.*

Performance Element: Use emergency procedures and protocols.

- ***Measurement Criteria:*** *Interpret the evacuation plan for the health care setting.*
- ***Measurement Criteria:*** *Construct an emergency plan for a health care setting in response to a natural disaster or other emergency.*
- ***Measurement Criteria:*** *Follow the facility procedure when a fire is discovered.*

Statement: Health care workers will understand the fundamentals of wellness and the prevention of disease processes. They will practice preventive health behaviors among the clients.

Performance Element: Describe healthy behaviors.

- ***Measurement Criteria:*** *Apply behaviors that promote health and wellness.*
- ***Measurement Criteria:*** *Advocate available preventive health screening and examinations.*
- ***Measurement Criteria:*** *Use practices that promote the prevention of disease and injury.*
- ***Measurement Criteria:*** *Use appropriate safety practices as related to high-risk behaviors.*

Cluster Knowledge and Skill Statement

Measurement Criteria: *Evaluate the validity of alternative health practices.*

Cluster Knowledge and Skill Statement

Leadership and Teamwork

Statement: Health care workers will understand the roles and responsibilities of individual members as part of the health care team, including their ability to promote the delivery of quality health care.

Performance Element: Describe health care teams.

- ***Measurement Criteria:*** *Apply the team concept in providing quality patient care.*
- ***Measurement Criteria:*** *Recognize characteristics of effective teams.*
- ***Measurement Criteria:*** *Analyze roles of various team participants.*
- ***Measurement Criteria:*** *Respond to given critical situations.*
- ***Measurement Criteria:*** *Accept compromise as necessary to ensure a best outcome.*

Performance Element: Describe team member participation.

- ***Measurement Criteria:*** *Communicate verbally and nonverbally with team colleagues to assure a best result for the client.*
- ***Measurement Criteria:*** *Collaborate with others to formulate team objectives.*
- ***Measurement Criteria:*** *Act responsibly as a team member, competing assigned tasks in a timely and effective manner.*
- ***Measurement Criteria:*** *Actively listen to other team members.*
- ***Measurement Criteria:*** *Exercise leadership skills as appropriate.*
- ***Measurement Criteria:*** *Respect and value the expertise and contributions of all team members.*
- ***Measurement Criteria:*** *Work collaboratively with persons from diverse backgrounds to accomplish a common goal.*
- ***Measurement Criteria:*** *Apply corrective action to an acknowledged conflict situation.*

Cluster Knowledge and Skill Statement

Ethics and Legal Responsibilities

Statement: Health care workers will understand the legal responsibilities, limitations, and implications of their actions within the health care delivery setting.

Performance Element: Describe legal implications.

- ***Measurement Criteria:*** *Analyze legal responsibilities, limitations, and implications of actions.*
- ***Measurement Criteria:*** *Use problem solving techniques when confronted with legal dilemmas or issues.*
- ***Measurement Criteria:*** *Compare and contrast behaviors and practices that could result in malpractice, liability, or negligence.*
- ***Measurement Criteria:*** *Comply with policies and requirements for documentation and record keeping.*
- ***Measurement Criteria:*** *Comply with established risk management criteria and procedures.*
- ***Measurement Criteria:*** *Determine when an incident is reportable.*
- ***Measurement Criteria:*** *Comply with non-discriminatory laws.*
- ***Measurement Criteria:*** *Comply with institutional policy and procedure.*

Performance Element: Describe legal practices.

- ***Measurement Criteria:*** *Perform duties according to regulations, policies, laws, and legislated rights of clients.*
- ***Measurement Criteria:*** *Maintain clients' rights according to the Patients' Bill of Rights.*
- ***Measurement Criteria:*** *Maintain confidentiality.*
- ***Measurement Criteria:*** *Practice within licensure, certification, registration, and legislated scope of practice.*
- ***Measurement Criteria:*** *Apply the doctrine of informed consent.*
- ***Measurement Criteria:*** *Evaluate technological threats to confidentiality.*
- ***Measurement Criteria:*** *Follow mandated standards for workplace safety, i.e., OSHA, CDC, CLIA.*
- ***Measurement Criteria:*** *Apply mandated standards for harassment, labor, and employment laws.*

Statement: Health care workers will understand accepted ethical practices with respect to cultural, social, and ethnic differences within the health care environment. They will perform quality health care delivery.

Performance Element: Describe legal and ethical boundaries.

- ***Measurement Criteria:*** *Differentiate between morality and ethics and the relationship of each to health care outcomes.*
- ***Measurement Criteria:*** *Differentiate between ethical and legal issues impacting health care.*
- ***Measurement Criteria:*** *Contract personal, professional, and organizational ethics.*
- ***Measurement Criteria:*** *Analyze legal and ethical aspects of confidentiality.*
- ***Measurement Criteria:*** *Discuss bio-ethical issues related to health care.*
- ***Measurement Criteria:*** *Analyze and evaluate the implications of medical ethics.*

Cluster Knowledge and Skill Statement

Performance Element: Describe ethical practice.

Measurement Criteria: *Demonstrate professionalism when interacting with fellow students, co-workers, and the organization.*

Measurement Criteria: *Respect interdisciplinary roles of team members.*

Measurement Criteria: *Report activities and behaviors by self and others that adversely affect the health, safety, or welfare of students, clients, or co-workers.*

Measurement Criteria: *Demonstrate fairness and equal treatment of all persons.*

Measurement Criteria: *Practice responsibly within the ethical framework of the Patients' Bill of Rights.*

Measurement Criteria: *Value clients' independence and determination.*

Performance Element: Understand cultural, social, and ethnic diversity.

Measurement Criteria: *Discuss the impact of religions and cultures on those giving and receiving health care with an understanding of past and present events.*

Measurement Criteria: *Demonstrate respect of individual cultural, social, and ethnic diversity within the health care environment.*

Cluster Knowledge and Skill Statement

Employability and Career Development

Statement: Health care workers will understand how employability skills enhance their employment opportunities and job satisfaction. They will demonstrate key employability skills and will maintain and upgrade skills, as needed.

Performance Element: Use Key Employability Skills.

- ***Measurement Criteria:*** *Adapt to the dynamics of change.*
- ***Measurement Criteria:*** *Adopt personal appearance and hygiene habits appropriate to the health care environment and industry expectations.*
- ***Measurement Criteria:*** *Practice personal integrity and honesty.*
- ***Measurement Criteria:*** *Evaluate work assignments and initiate action with confidence commensurate with work assignment.*
- ***Measurement Criteria:*** *Formulate solutions to problems using critical thinking skills (analyze, synthesize, evaluate) independently and in teams.*
- ***Measurement Criteria:*** *Interact appropriately and respectfully with diverse ethnic, age, cultural, religious, and economic groups in various employment and social situations.*
- ***Measurement Criteria:*** *Exhibit respectful and empathetic behavior when interacting with peers, superiors, subordinates, and customers in one-on-one and group situations.*
- ***Measurement Criteria:*** *Follow attendance policies of the employer or educational institution.*
- ***Measurement Criteria:*** *Accept responsibility for own actions.*

Performance Element: Use Interpersonal Communications.

- ***Measurement Criteria:*** *Communicate in a straightforward, understandable, accurate, and timely manner.*
- ***Measurement Criteria:*** *Listen attentively to verbal instruction, requests, and other information to verify accuracy.*
- ***Measurement Criteria:*** *Provide written communication that is accurate and grammatically correct, using nomenclature appropriate to the environment.*
- ***Measurement Criteria:*** *Interpret technical materials used for health care practices and procedures.*

Performance Element: Evaluate need for personal growth and development.

- ***Measurement Criteria:*** *Engage in continuous self-assessment and goals modification for personal and professional growth.*
- ***Measurement Criteria:*** *Manage time, prioritize responsibilities, and meet completion dates as specific by employer and client.*
- ***Measurement Criteria:*** *Show enthusiasm and commitment by meeting expectations and priorities of the organization.*

Performance Element: Utilize Career Decision-making Strategies.

- ***Measurement Criteria:*** *Explore a potential health science career path in at least one of the following health care services: diagnostic, therapeutic, information, or environmental.*
- ***Measurement Criteria:*** *Consider levels of education, credentialing requirements, employment opportunities, workplace environments, and career growth potential for a service area.*

Cluster Knowledge and Skill Statement

Technical Skills

Statement: Health care workers will apply technical skills required for all career specialties. They will demonstrate skills and knowledge as appropriate.

Performance Element: Understand occupational safety techniques.

Measurement Criteria: *Apply Standard Precautions as described in the rules and regulations set forth by the Occupational Safety and Health Administration (OSHA).*

Measurement Criteria: *Demonstrate safety procedures to protect clients, co-workers, and self.*

Measurement Criteria: *Obtain Cardiopulmonary Resuscitation (CPR) certification.*

Measurement Criteria: *Obtain First Aid Certification.*

Section III – Pathway Knowledge and Skills

PATHWAY: Therapeutic Services

Pathway Topic: Client Interaction

Pathway KS Statement: Therapeutic services professionals will be able to explain planned procedures to patients and health professionals including goals, side effects and coping strategies. They will use various strategies to respond to questions and concerns of patients.

Performance Element: Use Oral Communications.

Measurement Criteria: *Assess patients' understanding of the information provided.*

Measurement Criteria: *Demonstrate empathy for patients.*

Measurement Criteria: *Modify communication to the needs of the patients and appropriate to the situation.*

Performance Element: Use Written Communication.

Measurement Criteria: *Develop clear written patient information and instructions.*

Measurement Criteria: *Keep written records as appropriate within facility policies and protocols.*

Pathway Topic: Employ Intra Team Communication

Pathway KS Statement: Therapeutic services professionals will be able to communicate patient information among team members allowing for feedback as needed.

Performance Element: Understand Team Interactions.

Measurement Criteria: *Distinguish appropriate role and responsibilities of each team member.*

Measurement Criteria: *Respect and value the expertise and contributions of all team members.*

Measurement Criteria: *Evaluate relevancy of information to be conveyed.*

Measurement Criteria: *Formulate and report information in a way that in a clear And concise manner.*

Pathway Topic: Collect Information

Pathway KS Statement: Therapeutic services professionals will use facility protocol and regulatory guidelines for collecting patient information. They will participate in identifying patient heath care needs, strengths and problems and respond appropriately.

Performance Element: Collect Information.

Measurement Criteria: *Collect and format information using facility protocols and regulatory guidelines.*

Measurement Criteria: *Analyze information collected to develop appropriate therapeutic response.*

Measurement Criteria: *Maintain confidentiality according to facility protocol.*

Pathway Topic: Treatment Planning and Implementation

Pathway KS Statement: Therapeutic services professionals will understand the purposes of the treatment plan and collaborate in planning procedures that support the goals for the patient according to facility protocol, regulatory guidelines and within their scope of practice.

Pathway Topic: Treatment Planning and Implementation

Performance Element: Utilize planning strategies.

Measurement Criteria: *Create a treatment plan using a problem-solving model, incorporating patient input.*

Measurement Criteria: *Select appropriate resources to implement treatment plan.*

Measurement Criteria: *Evaluate the plan for appropriate outcomes.*

Performance Element: Implement treatment plan.

Measurement Criteria: *Evaluate priorities in order to organize work.*

Measurement Criteria: *Use equipment and instruments according to the manufacturer's guidelines and accepted safety practice.*

Measurement Criteria: *Document actions according to facility protocol and regulatory guidelines.*

Pathway Topic: Monitor Client Status

Pathway KS Statement: Therapeutic services professionals will monitor and assess patients' health status, and develop appropriate therapeutic response based on facility protocol.

Performance Element: Monitor Client.

Measurement Criteria: *Analyze and assess patient response.*

Measurement Criteria: *Assess need for follow up and changes to treatment plan.*

Measurement Criteria: *Respond to patient health changes as prescribed by facility protocol.*

Measurement Criteria: *Evaluate patient response to administered treatments and procedures.*

Pathway Topic: Evaluate Patient Status

Pathway KS Statement: Therapeutic services professionals will evaluate patient needs, strengths and problems in order to determine if treatment goals are being reached.

Performance Element: Evaluation.

Measurement Criteria: *Choose appropriate evaluation tools to assess patient response to treatment plan.*

Measurement Criteria: *Analyze information gathered.*

Measurement Criteria: *Revise or create modifications to treatment plan based on patient response.*

PATHWAY: Diagnostic Services

Pathway Topic: Multidisciplinary Communication

Pathway KS Statement: Diagnostic services professionals will communicate information within a healthcare environment. They will convey this information to the appropriate departments and other professionals in a timely manner.

Performance Element: Use Oral Communication Skills.

Measurement Criteria: *Adjust communication to other's ability to understand.*

Measurement Criteria: *Apply active listening skills using reflection, restatement, and clarification.*

Measurement Criteria: *Demonstrate courtesy to others, including self introduction.*

Measurement Criteria: *Interpret verbal and nonverbal behaviors to augment communication within scope of practice.*

Measurement Criteria: *Demonstrate interviewing skills.*

Performance Element: Apply Written Communication Skills.

Measurement Criteria: *Choose correct syntax and grammar appropriate to patient.*

Measurement Criteria: *Report relevant information in a timely manner.*

Measurement Criteria: *Distinguish between subjective and objective information when reporting.*

Measurement Criteria: *Analyze communication for appropriate response and provide feedback.*

Measurement Criteria: *Organize, write and compile technical information and summaries.*

Measurement Criteria: *Use medical terminology in order to interpret, transcribe and communicate information, data and observations.*

Pathway Topic: Assessment

Pathway KS Statement: Diagnostic services professionals will be proficient in the processes to assess and report health status of the patient.

Performance Element: Assess patient's health status.

Measurement Criteria: *Analyze available information to assess patient viability.*

Measurement Criteria: *Complete procedures for attaining information necessary that is not readily available.*

Measurement Criteria: *Evaluate and appraise appropriateness of information.*

Measurement Criteria: *Evaluate patient and other client response to treatment and/or procedure.*

Measurement Criteria: *Document results accurately and appropriately.*

Pathway Topic: Move Patient

Pathway KS Statement: Diagnostic services professionals will apply the principles of body mechanics for positioning, transferring, and transporting of patients. These activities will be performed efficiently without injury to the patient or self.

Performance Element: Apply techniques for patient safety.

Measurement Criteria: *Assess the patient status.*

Measurement Criteria: *Evaluate potential hazards to patient.*

Pathway Topic: Move Patient

Measurement Criteria: *Choose and apply appropriate transport methods.*

Measurement Criteria: *Choose and apply appropriate transfer methods.*

Measurement Criteria: *Modify positioning to accommodate patient status.*

Measurement Criteria: *Choose and practice effective and appropriate infection control procedures.*

Performance Element: Apply Techniques for Personal Safety.

Measurement Criteria: *Utilize principles of standard precautions.*

Measurement Criteria: *Apply principles of body mechanics and ergonomics.*

Measurement Criteria: *Prevent injury by using proper safety equipment and techniques.*

Measurement Criteria: *Choose engineering controls as appropriate.*

Performance Element: Use Equipment Safely.

Measurement Criteria: *Evaluate equipment for possible hazards.*

Measurement Criteria: *Choose appropriate equipment for transportation.*

Measurement Criteria: *Choose appropriate equipment for transfer.*

Measurement Criteria: *Adjust equipment and modify techniques to accommodate patient status.*

Measurement Criteria: *Practice preventive measures for disease transmission during equipment use.*

Pathway Topic: Patient Interaction

Pathway KS Statement: Diagnostic services professionals will accurately and effectively explain procedures and goals to the patient. A variety of strategies will be used to respond to questions and concerns of the patient.

Performance Element: Explain Procedures and Goals.

Measurement Criteria: *Assess ability of patient to comprehend.*

Measurement Criteria: *Adjust and modify based on assessment.*

Measurement Criteria: *Verify patient understanding.*

Performance Element: Apply Interaction Strategies.

Measurement Criteria: *Apply active listening skills using reflection, restatement, and clarification techniques.*

Measurement Criteria: *Address patient concerns in a positive manner.*

Pathway Topic: Preparation

Pathway KS Statement: Diagnostic services professionals will appropriately respond to requests for procedures, interpret the requests, and plan implementation of services as well as preparation for specific procedures.

Performance Element: Process Procedural Requests.

Measurement Criteria: *Comprehend concept of scope of practice.*

Measurement Criteria: *Evaluate procedure requested for appropriateness.*

Measurement Criteria: *Coordinate interdisciplinary services if necessary.*

Performance Element: Implement Services.

Measurement Criteria: *Complete plan for implementation of services requested.*

Measurement Criteria: *Initiate services based on plan.*

Pathway Topic: Preparation

Performance Element: Protocol Preparation.

Measurement Criteria: *Choose appropriate protocol based on patient assessment and request.*

Measurement Criteria: *Choose protocol based on resources.*

Performance Element: Prepare Patient.

Measurement Criteria: *Verify patient identification.*

Measurement Criteria: *Ensure patient readiness and assess for contraindication.*

Measurement Criteria: *Obtain patient informed consent if applicable.*

Pathway Topic: Procedure Implementation

Pathway KS Statement: Diagnostic services professionals interpret any given procedure, are knowledgeable of the purpose for each procedure and perform the specific procedure to create diagnostic results.

Performance Element: Procedure Performance.

Measurement Criteria: *Cognizant of their scope of practice.*

Measurement Criteria: *Perform procedure competently within their scope of practice.*

Measurement Criteria: *Perform procedure according to protocol.*

Measurement Criteria: *Modify procedure as required within constraints of patient and personal safety.*

Pathway Topic: Evaluation and Reporting

Pathway KS Statement: Diagnostic services professionals will apply the principles of quality assurance/performance improvement as applied to the specific disciplines as well as reporting in a timely manner, utilizing appropriate communication channels.

Performance Element: Procedural Evaluation.

Measurement Criteria: *Assess the quality of results.*

Measurement Criteria: *Analyze, construct and apply appropriate corrective measures/actions.*

Performance Element: Personal Evaluation.

Measurement Criteria: *Evaluate quality of results.*

Measurement Criteria: *Assess problem-solving skills.*

Measurement Criteria: *Evaluate timeliness and productivity.*

Performance Element: Equipment.

Measurement Criteria: *Evaluate quality of results.*

Measurement Criteria: *Analyze, construct and apply appropriate corrective measures.*

Performance Element: Quality Assurance/Performance Improvement.

Measurement Criteria: *Choose appropriate evaluation methods.*

Measurement Criteria: *Evaluate and apply appropriate tools.*

Performance Element: Reporting Methods.

Measurement Criteria: *Use written, oral and electronic communication skills to produce reports.*

Measurement Criteria: *Deliver reports to all appropriate parties.*

Pathway Topic: Evaluation and Reporting

Measurement Criteria: *Develop and utilize protocols that verify the parties involved receive all necessary information.*

PATHWAY: Health Infomatics

Pathway Topic: Communication and Confidentiality

Pathway KS Statement: Health informatics professionals will communicate health/medical information accurately and within legal/regulatory guidelines established by the facility holding to the strictest standards of confidentiality.

Performance Element: Communication.

Measurement Criteria: *Manage the accuracy, effectiveness, and timeliness of the transfer of information.*

Measurement Criteria: *Evaluate how legal and regulatory requirements apply to the transfer of information.*

Measurement Criteria: *Distinguish who in the organization needs information and when they need it.*

Performance Element: Confidentiality.

Measurement Criteria: *Manage recorded information and other documents within protocols that ensure confidentiality and privacy.*

Measurement Criteria: *Communicate information ensuring confidentiality of content is maintained.*

Measurement Criteria: *Communicate information on a need to know basis for optimum patient outcomes.*

Pathway Topic: Analysis

Pathway KS Statement: Health informatics professionals will know the quantitative and qualitative requirements for information. They will analyze the information for designated purposes.

Performance Element: Analysis.

Measurement Criteria: *Synthesize information to determine the best course of action.*

Measurement Criteria: *Assess health information required by patients, staff, and the community.*

Measurement Criteria: *Assemble all necessary data components for successful completion of tasks.*

Measurement Criteria: *Appraise the accuracy and completeness of data.*

Measurement Criteria: *Assess whether information is reported and disseminated within legal, ethical and regulatory guidelines.*

Pathway Topic: Abstracting and Coding

Pathway KS Statement: Health informatics professionals will read and interpret and extract information from medical documents, applying knowledge of medical terminology and codes.

Performance Element: Abstracting and Coding.

Measurement Criteria: *Assemble appropriate, accurate information, including proper codes to record charges for reimbursement.*

Measurement Criteria: *Apply accurate medical terminology.*

Measurement Criteria: *Analyze and determine the need for requesting further clarification when transcribing/transferring information that may be unclear.*

Measurement Criteria: *Assess and apply information for regulatory and legal*

Pathway Topic: Abstracting and Coding

purposes.

Pathway Topic: Information Systems

Pathway KS Statement: Health informatics professionals will understand the resources, routes and flow of information within the health care system. They will participate in the design and implementation of effective information systems or processes.

Performance Element: Information Systems.

Measurement Criteria: *Integrate the information systems utilized by the organization.*

Measurement Criteria: *Assess how systems interact to facilitate the timely and accurate flow.*

Measurement Criteria: *Organize information within the parameters of the information systems.*

Measurement Criteria: *Integrate information for timely, accurate dissemination.*

Measurement Criteria: *Evaluate effectiveness of systems.*

Pathway Topic: Documentation and Storage

Pathway KS Statement: Health informatics professionals will understand the content and diverse uses of health information. They will accurately document, communicate and maintain appropriate information using legal and regulatory guidelines.

Performance Element: Documentation.

Measurement Criteria: *Accurately document required information.*

Measurement Criteria: *Interpret information that has been collected.*

Measurement Criteria: *Differentiate the purposes and audiences for whom the information is collected.*

Measurement Criteria: *Prepare accurate documentation for various audiences within legal and regulatory requirements, as requested.*

Measurement Criteria: *Disseminate information to various audiences using systems and guidelines within the facility.*

Measurement Criteria: *Establish and maintain a records storage system within legal requirements and protocols.*

Measurement Criteria: *Assess and recommend procedures for improvement as necessary.*

Pathway Topic: Operations

Pathway KS Statement: Health informatics professionals will know the systems operations used to capture, retrieve, and maintain information from internal and external sources. They will utilize internal and external information and resources accurately and efficiently.

Performance Element: Operations.

Measurement Criteria: *Analyze the internal and external sources of information and resources available.*

Measurement Criteria: *Project outcomes as interconnected components of a modified health care system.*

Measurement Criteria: *Select the systems and sources of information necessary for the*

Pathway Topic: Operations

successful completion of the task.

Measurement Criteria: *Participate in the design of operational systems and processes.*

Measurement Criteria: *Evaluate operational systems and processes for areas of improvement as necessary.*

PATHWAY: Support Services

Pathway Topic: Operations

Pathway KS Statement: Support services professionals will review, assess, differentiate, and enhance the responsibilities of their roles. They will perform their tasks safely following established internal and external guidelines.

Performance Element: Administration.

Measurement Criteria: *Develop/implement departmental mission statement, goals, objectives, and strategic plan.*

Measurement Criteria: *Develop/implement departmental policies, procedures, processes and modify as needed.*

Measurement Criteria: *Coordinate departmental activities with other departments, outside agencies and contractors, including event planning and logistics.*

Measurement Criteria: *Develop/implement new and existing services specific to the working environment and responsibilities.*

Measurement Criteria: *Design and recommend implementation of an employee recognition program.*

Performance Element: Quality Measurement and Improvement.

Measurement Criteria: *Monitor patient and organizational expectations through satisfaction survey and measurement tools to assure adequacy of products and services and performance improvement as necessary.*

Measurement Criteria: *Participate and provide support standardization, consolidation and/or re-engineering processes.*

Measurement Criteria: *Evaluate cost effectiveness of alternative methodologies.*

Measurement Criteria: *Perform quality management activities.*

Performance Element: Compliance.

Measurement Criteria: *Adhere to a code of ethics to ensure corporate compliance.*

Measurement Criteria: *Ensure compliance with legal, regulatory, and accreditation standards or codes.*

Measurement Criteria: *Coordinate with environmental health agency to administer the hazardous materials management program.*

Measurement Criteria: *Coordinate with physicians, departmental directors/managers, and outside agencies in the development of Emergency Preparedness Plans.*

Measurement Criteria: *Inspect buildings/facilities and grounds to ensure compliance with standards, regulations, and codes.*

Measurement Criteria: *Check work of staff to ensure compliance with applicable safety and building regulations.*

Pathway Topic: Aseptic Procedures

Pathway KS Statement: Support services professionals will adopt work practices that maintain a clean and healthy environment. They will demonstrate best practices to reduce or eliminate pathogenic organisms.

Performance Element: Cleaning and Decontamination.

Measurement Criteria: *Demonstrate various decontamination techniques and*

Pathway Topic: Aseptic Procedures

procedures.

Measurement Criteria: *Demonstrate knowledge of standards precaution guidelines.*

Measurement Criteria: *Select procedures and precautions to be followed when using chemicals.*

Measurement Criteria: *Demonstrate techniques for mechanical and manual cleaning procedures.*

Measurement Criteria: *Evaluate potential causes and methods of transmitting infection (e.g., contact, airborne, blood-borne, common vehicle, vector-borne).*

Measurement Criteria: *Integrate infection control standards with relevant activities and procedures.*

Performance Element: Hazardous Materials and Waste Management.

Measurement Criteria: *Develop, implement, and monitor hazardous waste disposal and recycling policies and procedures in accordance with regulatory requirements.*

Measurement Criteria: *Assess and monitor the operations of a waste management program, including recycling and reduction of regulated medical, solid, hazardous chemical and radioactive and biological waste materials.*

Measurement Criteria: *Develop systems and procedures that minimize customer cost of ordering, storing, and using supplies, services, and equipment.*

Measurement Criteria: *Ensure that regulated waste is safely handled, packaged, stored and disposed of in accordance with federal, state, and local regulations and maintain appropriate documentation.*

Performance Element: Materials Handling and Storage.

Measurement Criteria: *Demonstrate process and environmental requirements for proper handling and storage of sterile and non-sterile items.*

Measurement Criteria: *Demonstrate appropriate inventory control and distribution systems.*

Measurement Criteria: *Describe and implement a program to purchase materials, supplies and capitol equipment within allocated resources.*

Measurement Criteria: *Evaluate effectiveness optimal material flow and layout.*

Measurement Criteria: *Recommend policies and procedures to monitor distribution, consumption and pilferage of materials.*

Pathway Topic: Resource Management

Pathway KS Statement: Support services professionals will make appropriate decisions to maximize the use of available resources for both purchase and maintenance of equipment and materials.

Performance Element: Finance.

Measurement Criteria: *Participate and evaluate purchasing processes and agreements.*

Measurement Criteria: *Evaluate audit activities, including the review of discrepancies, purchase orders, and invoices.*

Measurement Criteria: *Assess cost benefits that support best product*

Pathway Topic: Resource Management

recommendations.

Measurement Criteria: *Explain competitive pricing, terms, and service levels.*

Measurement Criteria: *Identify opportunities for reduction in resource consumption.*

Measurement Criteria: *Develop inventory reduction targets and process to achieve targets.*

Performance Element: Acquisition and Distribution.

Measurement Criteria: *Assess and implement purchasing and procurement techniques that improve the overall supply chain.*

Measurement Criteria: *Analyze timely order placement, supplier performance, and continuously review for effectiveness.*

Measurement Criteria: *Assess a supplier performance standards program.*

Measurement Criteria: *Organize catalogs, price lists, inventory records, purchase order files, and product/supplier files, ensuring that they are updated and current.*

Measurement Criteria: *Assess and offer recommendations to departments requiring assistance in resource allocation.*

Measurement Criteria: *Assess the integration of resource functions.*

Measurement Criteria: *Evaluate distribution strategies and systems to ensure optimal materials flow.*

Measurement Criteria: *Maintain adequate quantities of supplies, equipment, instruments and medical devices.*

Performance Element: Equipment and Maintenance.

Measurement Criteria: *Participate in capital purchasing processes.*

Measurement Criteria: *Assess procedures and processes for the selection, acquisition, distribution, and maintenance of equipment.*

Measurement Criteria: *Apply written instructions for the equipment manufactures operations manual, departmental policies and procedures.*

Measurement Criteria: *Design a preventive maintenance (PM) process for buildings, equipment, parts, supplied, and utilities as appropriate.*

Measurement Criteria: *Participate in equipment and systems training programs for maintenance staff and user groups.*

Performance Element: Staffing and Productivity.

Measurement Criteria: *Participate in a comprehensive training and education program, covering such aspects as safety, infection control, hazardous materials, and new equipment use.*

Measurement Criteria: *Analyze labor distribution for projects and operations.*

Measurement Criteria: *Review and evaluate reporting mechanisms for departmental functions.*

Pathway Topic: Aesthetics

Pathway KS Statement: Support services professionals will promote the establishment, maintenance, and improvement of the facility environment. They will assist in the development and implementation of facility standards.

Performance Element: Physical Environment and Presentation.

Measurement Criteria: *Coordinate with other departments to select facility finishes*

Pathway Topic: Aesthetics

and furnishings within appropriate safety codes.

Measurement Criteria: *Participate in the development of design and construction plans.*

Measurement Criteria: *Analyze the therapeutic and functional aspects of color décor and furnishing.*

Measurement Criteria: *Provide facility accessibility through appropriate wayfinding and maintaining a clutter free environment.*

Measurement Criteria: *Evaluate repair status of facility and report recommendations as appropriate.*

Measurement Criteria: *Organize, deliver and present products and services in a quality manner.*

PATHWAY: Biotechnology Research and Development

Pathway Topic: Contributions of Biotechnology to health and the human condition

Pathway KS Statement: Biotechnology R&D professionals will understand that the goal of biotechnology products is to improve the quality of life within legal and ethical protocols.

Performance Element: Identify contributions to quality of life.

Measurement Criteria: *Propose an individual life or industrial enzyme that could be used for treating disease and contribute to the quality of life.*

Measurement Criteria: *Generate a list of environmental diseases or chronic conditions that have been or could be treated with biotechnology products.*

Performance Element: Assess Legal and Ethical Considerations.

Measurement Criteria: *Assess a current biotechnology-related ethical issue in the "news", list the basic ethical considerations and how the issue may affect the quality of life.*

Pathway KS Statement:

Pathway Topic: Academic Foundations

Pathway KS Statement: Biotechnology R&D professionals will be knowledgeable in the fundamentals of biochemistry, cell biology, genetics, mathematical concepts, microbiology, molecular biology, organic chemistry, and statistics.

Performance Element: Apply Mathematical concepts.

Measurement Criteria: *Illustrate the concepts of percentages and ratios using a biotechnology application.*

Measurement Criteria: *Contract weight-to-weight and weight-to-volume calculations for solutions.*

Measurement Criteria: *Explain scientific notation.*

Performance Element: Use Statistical data.

Measurement Criteria: *Compare the standard deviation and the mean of data results from testing effectiveness of two biotechnology products.*

Measurement Criteria: *Graphically illustrate a set of biotech data such that a layman would understand it.*

Performance Element: Understand Genetics.

Measurement Criteria: *Describe the basic structure of a chromosome.*

Measurement Criteria: *Construct a karyotype with human chromosomes.*

Measurement Criteria: *Differentiate the genetic inheritance of a dominant homozygous trait (e.g. dwarfism) from a heterozygous disease (e.g., sickle cell anemia).*

Performance Element: Apply principles of organic chemistry.

Measurement Criteria: *Construct a molecule of a compound with 3 or more carbon atoms.*

Measurement Criteria: *Create an equation of two organic substrates leading to a*

Pathway Topic: Academic Foundations

product.

Measurement Criteria: *Describe atomic number, atomic mass and orbitals.*

Measurement Criteria: *Contrast covalent, ionic and hydrogen bonding.*

Performance Element: Apply principles of biochemistry.

Measurement Criteria: *Diagram six chemical side groups that could be in a biotechnology product.*

Measurement Criteria: *Categorize all amino acids into essential and non-essential.*

Measurement Criteria: *Describe the relationship between biochemistry and biotechnology product development.*

Measurement Criteria: *Compare the underlying reasons why some molecules are hydrophilic and some are hydrophobic.*

Performance Element: Apply principles of cell biology.

Measurement Criteria: *Describe the basic structures and functions of cells and how this knowledge is used in biotechnology.*

Measurement Criteria: *Select cellular barriers to be overcome for a biotechnology product to work inside a cell.*

Performance Element: Apply principles of molecular biology.

Measurement Criteria: *Diagram the structure of the nucleic acid DNA.*

Measurement Criteria: *Demonstrate DNA replication graphically and its' importance to biotechnology product development.*

Measurement Criteria: *Describe the central dogma of molecular biology and how understanding this process impacts biotechnology research and development.*

Performance Element: Apply principles of microbiology.

Measurement Criteria: *Analyze how microorganisms are used in mass producing recombinant proteins.*

Measurement Criteria: *Compare and contrast bacterial, fungal, and animal cells and how these similarities and differences affect biotechnology product development and production decisions.*

Measurement Criteria: *Compare and contrast the use of plasmids in bacterial transformation and the process of plasmid DNA isolation.*

Pathway Topic: Understand Biotechnology Knowledge Areas and Techniques

Pathway KS Statement: Biotechnology R&D professionals will be introduced to recombinant DNA, genetic engineering, bioprocessing, monoclonal antibody production, nanotechnology, bioinformatics, genomics, proteomics and transcriptomics.

Performance Element: Identify techniques used in biotechnolgy.

Measurement Criteria: *Describe the following techniques; recombinant DNA, genetic engineering, monoclonal antibody production, separation and purification of biotechnology products and bioprocessing.*

Performance Element: Identify trends in the field of biotechnology.

Measurement Criteria: *Predict how nanotechnology, bioinformatics, proteomics,*

Pathway Topic: Understand Biotechnology Knowledge Areas and Techniques

genomics and transcriptomics will create new career opportunities.

Pathway Topic: Laboratory Protocols and Procedures

Pathway KS Statement: Biotechnology R&D professionals will understand the principles of solution preparation, sterile techniques, contamination control, & measurement and calibration of instruments. They will maintain a safe laboratory environment using biosafety protocols.

Performance Element: Use Procedures.

Measurement Criteria: *Describe how molarity relates to solution preparation.*

Measurement Criteria: *Calculate the molarity of a given solution and measure the pH of this solution.*

Measurement Criteria: *Prepare a serial dilution of a microbial culture starting with 10-3 going to 10-8 and plate on to nutrient agar petri dishes. Determine the original concentration of the microbial culture.*

Performance Element: Apply protocols.

Measurement Criteria: *Describe the criticality of the requirements of sterile techniques.*

Measurement Criteria: *Respond to a hypothetical laboratory accident appropriately as a member of a laboratory team.*

Pathway Topic: Product Development and Regulation

Pathway KS Statement: Biotechnology R&D professionals will know the process for product design and production and how their work contributes to the result.

Performance Element: Understand product development.

Measurement Criteria: *Diagram the process involved in making one biotech product in an industrial setting.*

Measurement Criteria: *Analyze the role of pre-clinical and clinical trials in biotechnology product development.*

Performance Element: Understand regulation.

Measurement Criteria: *Examine the role of a Quality Assurance person in this process.*

Measurement Criteria: *Define cGMP and why it is important in biotech production.*

Pathway Topic: Apply principles of bioethical conduct

Pathway KS Statement: Biotechnology R&D professionals will understand the larger ethical, moral and legal issues related to biotech research, product development and use in society.

Performance Element: Understand biotechnological implications on society.

Measurement Criteria: *Differentiate between morality and ethics and the relationship of each to biotechnology health care product development.*

Measurement Criteria: *Discuss bioethical issues related to biogenetic products.*

Measurement Criteria: *Contrast personal, professional and organizational ethics.*

Performance Element: Apply institutional protocols.

Pathway Topic: Apply principles of bioethical conduct

Measurement Criteria: *Comply with policies and requirements for documentation and record keeping.*

Measurement Criteria: *Comply with institutional ethical policies and procedures.*

Section IV – O*NET Crosswalk Report

Career Specialty/ Occupational Coding and Crosswalk

Summary

The objective of the Career Specialty/ Occupational Coding and Crosswalk project is to accomplish two basic tasks. The first is to design and establish a classification and coding structure for the States' Career Clusters Initiative. When completed, the classification and coding structure will be compatible with existing occupational classification systems and designed in a manner that allows for easy updating and the flexibility to add additional career pathways and occupational specialties.

Once the first step is completed for each cluster, the second step is to build a linkage system or crosswalk between the new career cluster classification system and the O*NET occupational classification system developed and operated by the U S Department of Labor. O*NET is a nationally recognized taxonomy with detailed descriptions and a rich database of information for each occupation.

Explanation of Crosswalk Table

The attached table lists each occupational specialty and its related O*NET occupation. It is sequenced by career pathway and occupational specialty code. It should be noted that the relationship between an occupational specialty and its related O*NET occupation is often not one-to-one. The O*NET occupation is often much broader covering two or more occupational specialties. In fact, even when multiple occupational specialties are assigned, they may only represent a part of a broader O*NET occupation.

Column 1: Lists occupational specialties that were identified by the Career Clusters Initiative. The occupational specialties are organized by cluster pathways and represent occupational titles with no definitions. They are intended to be a sample of occupations that help define the cluster and pathway.

Column 2: Represents related occupations from the O*NET occupational coding system.

Note: A crosswalk from the occupational specialties to the Classification of Instructional Programs (CIP) codes is forthcoming. The National Crosswalk Service Center is currently developing the CIP to O*NET crosswalk which will be the bridge to the career cluster occupational specialties. You may access this crosswalk in the near future at: http://www.xwalkcenter.org/

Health Science Career Cluster: Occupational Specialties and Related O*NET Occupations, Sequenced by Career Pathway and Occupational Specialty Code

Occupational Specialty		Related SOC/O*NET Occupation	
Code	**Title**	**Code**	**Title**
8.10000	**Therapeutic Services Pathway**		
8.10010	Acupuncturist	29-1199.00	Health Diagnosing and treating Practitioners, All Other
8.10020	Anesthesiologist Assistant	29-1111.00	Registered Nurses
8.10030	Art / Music / Dance Therapist(s)	29-1125.00	Recreational Therapists
8.10040	Athletic Trainer	29-9091.00	Athletic Trainers
8.10050	Audiologist	29-1121.00	Audiologists
8.10060	Certified Nursing Assistant	31-1012.00	Nursing Aides, Orderlies, and Attendants
8.10070	Chiropractor	29-1011.00	Chiropractors
8.10080	Dental Assistant / Hygienist	31-9091.00	Dental Assistants
8.10090	Dental Lab Technician	51-9081.00	Dental Laboratory Technicians
8.10100	Dentist	29-1021.00	Dentists, General
8.10110	Dietician	29-1031.00	Dietitians and Nutritionists
8.10120	Dosimetrist	29-1124.00	Radiation Therapists
8.10130	Emergency Medical Technician (EMT)	29-2041.00	Emergency Medical Technicians and Paramedics
8.10140	Exercise Physiologist	29-1123.00	Physical Therapists
8.10150	Home Health Aide	31-1011.00	Home Health Aides
8.10160	Kinesiotherapist	29-1123.00	Physical Therapists
8.10170	Licensed Practical Nurse	29-2061.00	Licensed Practical and Licensed Vocational Nurses
8.10180	Massage Therapist	31-9011.00	Massage Therapists
8.10190	Medical Assistant	31-9092.00	Medical Assistants
8.10200	Mortician	13-1041.06	Coroners
8.10210	Occupational Therapist / Asst	29-1122.00	Occupational Therapists
8.10210	Occupational Therapist / Asst	31-2012.00	Occupational Therapist Aides
8.10210	Occupational Therapist / Asst	31-2011.00	Occupational Therapist Assistants
8.10220	Ophthalmic Medical Personnel	51-9083.00	Ophthalmic Laboratory Technicians
8.10230	Optometrist	29-1041.00	Optometrists
8.10240	Orthotist/Prosthetist	29-1024.00	Prosthodontists
8.10250	Paramedic	29-2041.00	Emergency Medical Technicians and Paramedics
8.10260	Pharmacist/Pharmacy Tech	29-1051.00	Pharmacists
8.10260	Pharmacist/Pharmacy Tech	29-2052.00	Pharmacy Technicians
8.10270	Physical Therapist / Assistant	29-1123.00	Physical Therapists

Health Science Career Cluster: Occupational Specialties and Related O*NET Occupations, Sequenced by Career Pathway and Occupational Specialty Code

Occupational Specialty		Related SOC/O*NET Occupation	
Code	**Title**	**Code**	**Title**
8.10270	Physical Therapist / Assistant	31-2022.00	Physical Therapist Aides
8.10270	Physical Therapist / Assistant	31-2021.00	Physical Therapist Assistants
8.10280	Physician (MD/DO)	29-1061.00	Anesthesiologists
8.10280	Physician (MD/DO)	29-1062.00	Family and General Practitioners
8.10280	Physician (MD/DO)	29-1063.00	Internists, General
8.10280	Physician (MD/DO)	29-1064.00	Obstetricians and Gynecologists
8.10280	Physician (MD/DO)	29-1065.00	Pediatricians, General
8.10280	Physician (MD/DO)	29-1066.00	Psychiatrists
8.10280	Physician (MD/DO)	29-1067.00	Surgeons
8.10290	Physician's Assistant	29-1071.00	Physician Assistants
8.10300	Psychologist	19-3030.00	Psychologist
8.10310	Recreation Therapist	29-1125.00	Recreational Therapists
8.10320	Registered Nurse	29-1111.00	Registered Nurses
8.10330	Respiratory Therapist	29-1126.00	Respiratory Therapists
8.10340	Social Worker	29-1020.00	Social Worker
8.10350	Speech Language Pathologist	29-1127.00	Speech-Language Pathologists
8.10360	Surgical Technician	29-2055.00	Surgical Technologists
8.10370	Veterinarian/ Vet Tech	29-1131.00	Veterinarians
8.10370	Veterinarian/ Vet Tech	29-2056.00	Veterinary Technologists and Technicians
8.20000	**Diagnostics Services Pathway**		
8.20010	Cardiovascular Technologist	29-2031.00	Cardiovascular Technologists and Technicians
8.20020	Clinical Lab Technician	29-2012.00	Medical and Clinical Laboratory Technicians
8.20030	Computer Tomography (CT) Technologist	29-2034.01	Radiologic Technologists
8.20040	Cytogenetic Technologist	29-2011.00	Medical and Clinical Laboratory Technologists
8.20050	Cytotechnologists	29-2011.00	Medical and Clinical Laboratory Technologists
8.20060	Diagnostic Medical Sonographers	29-2032.00	Diagnostic Medical Sonographers
8.20070	Electrocardiographic (ECG) Technician	29-2031.00	Cardiovascular Technologists and Technicians
8.20080	Electronic Diagnostic (EEG) Technologist	29-2099.00	Health Technologists and Technicians, All Other
8.20090	Exercise Physiologist	29-1123.00	Physical Therapists
8.20100	Geneticist	19-1029.00	Biological Scientist, All Other

Health Science Career Cluster: Occupational Specialties and Related O*NET Occupations, Sequenced by Career Pathway and Occupational Specialty Code

Occupational Specialty		Related SOC/O*NET Occupation	
Code	**Title**	**Code**	**Title**
8.20110	Histotechnician	29-2012.00	Medical and Clinical Laboratory Technicians
8.20120	Histotechnologist	29-2011.00	Medical and Clinical Laboratory Technologists
8.20130	Magnetic Resonance (MR) Technologist	29-2034.01	Radiologic Technologists
8.20140	Mammographer	29-2034.00	Radiologic Technologists and Technicians
8.20150	Medical Technologist / Clinical Laboratory Scientist	29-2011.00	Medical and Clinical Laboratory Technologists
8.20150	Medical Technologist / Clinical Laboratory Scientist	19-1042.00	Medical Scientists, Except Epidemiologists
8.20160	Nuclear Medicine Technologist	29-2033.00	Nuclear Medicine Technologists
8.20170	Nutritionist	29-1031.00	Dietitians and Nutritionists
8.20180	Pathologist	29-1069.00	Physicians and Surgeons, All Other
8.20190	Pathology Assistant	29-2011.00	Medical and Clinical Laboratory Technologists
8.20200	Phlebotomist	31-9099.00	Healthcare Support Workers, All Other
8.20210	Positron Emission Tomography (PET) Technologist	29-2034.01	Radiologic Technologists
8.20220	RadiologicTechnologist/Radiographer	29-2034.01	Radiologic Technologists
8.20230	Radiologist	29-1069.00	Physicians and Surgeons, All Other
8.30000	**Health Informatics Pathway**		
8.30010	Admitting Clerk	43-4111.00	Interviewers, Except Eligibility and Loan
8.30020	Applied Researcher	99-9999.00	To broad to classify to a specific O*NET occupation
8.30030	Community Services Specialists	21-1022.00	Medical and Public Health Social Workers
8.30040	Data Analyst	13-1111.00	Management Analysts
8.30050	Epidemiologist (SHSMD Stratsociety.org)	19-1041.00	Epidemiologists
8.30060	Ethicist	19-3099.00	Social Scientists and Related Workers, All Other
8.30070	Health Educator	21-1091.00	Health Educators
8.30080	Health Information Coder	31-9094.00	Medical Transcriptionists
8.30090	Health Information Services	29-2071.00	Medical Records and Health Information Technicians
8.30100	Healthcare Administrator	11-9111.00	Medical and Health Services Managers
8.30110	Medical Assistant	31-9092.00	Medical Assistants
8.30120	Medical Biller/Patient Financial Services	43-3021.03	Billing, Posting, and Calculating Machine Operators
8.30130	Medical Information Technologist	29-2071.00	Medical Records and Health Information Technicians
8.30140	Medical Librarian/Cybrarian	25-4021.00	Librarians
8.30150	Patient Advocates	23-2099.00	Legal Support Workers, All Other

Health Science Career Cluster: Occupational Specialties and Related O*NET Occupations, Sequenced by Career Pathway and Occupational Specialty Code

Occupational Specialty		Related SOC/O*NET Occupation	
Code	**Title**	**Code**	**Title**
8.30160	Public Health Educator	21-1022.00	Medical and Public Health Social Workers
8.30170	Reimbursement Specialist (HFMA)	43-4051.00	Customer Service Representatives
8.30180	Risk Management	11-9199.00	Managers, All Other
8.30190	Social Worker	21-1020.00	Social Workers
8.30200	Transcriptionist	31-9094.00	Medical Transcriptionists
8.30210	Unit Coordinator	11-9111.00	Medical and Health Services Managers
8.30220	Utilization Manager	11-9111.00	Medical and Health Services Managers
8.40000	**Support Services Pathway**		
8.40010	Biomedical / Clinical Engineer	17-2031.00	Biomedical Engineers
8.40020	Biomedical / Clinical Technician	19-4021.00	Biological Technicians
8.40020	Biomedical / Clinical Technician	29-2012.00	Medical and Clinical Laboratory Technicians
8.40030	Central Services	99-9999.00	To broad to classify to a specific O*NET occupation
8.40040	Environmental Health and Safety	19-4091.00	Environmental Science and Protection Technicians, Including Health
8.40040	Environmental Health and Safety	19-2041.00	Environmental Scientists and Specialists, Including Health
8.40050	Environmental Services	17-3025.00	Environmental Engineering Technicians
8.40050	Environmental Services	17-2081.00	Environmental Engineers
8.40060	Facilities Manager	11-3011.00	Administrative Services Managers
8.40070	Food Service	99-9999.00	To broad to classify to a specific O*NET occupation
8.40080	Hospital Maintenance Engineer	51-8021.00	Stationary Engineers and Boiler Operators
8.40090	Industrial Hygienist	29-9011.00	Occupational Health and Safety Specialists
8.40100	Materials Management	11-3011.00	Administrative Services Managers
8.40110	Transport Technician	11-3071.01	Transportation Managers
8.50000	**Biotechnology Research and Development**		
8.50010	Biochemist	19-1021.01	Biochemists
8.50020	Bioinformatics Associate	15-1011.00	Computer and Information Scientists, Research
8.50030	Bioinformatics Scientist	15-1011.00	Computer and Information Scientists, Research
8.50040	Bioinformatics Specialist	15-1041.00	Computer Support Specialists
8.50050	Biomedical Chemist	19-1042.00	Medical Scientists, Except Epidemiologists

Health Science Career Cluster: Occupational Specialties and Related O*NET Occupations, Sequenced by Career Pathway and Occupational Specialty Code

Occupational Specialty		Related SOC/O*NET Occupation	
Code	**Title**	**Code**	**Title**
8.50060	Biostatistician	15-2041.00	Statisticians
8.50070	Cell Biologist	19-1020.01	Biologists
8.50080	Clinical Trials Research Associate	99-9999.00	To broad to classify to a specific O*NET occupation
8.50090	Clinical Trials Research Coordinator	99-9999.00	To broad to classify to a specific O*NET occupation
8.50100	Geneticist	19-1029.00	Biological Scientist, All Other
8.50110	Lab Assistant-Genetics	19-4021.00	Biological Technicians
8.50120	Lab Technician	19-4021.00	Biological Technicians
8.50130	Microbiologist	19-1022.00	Microbiologists
8.50140	Molecular Biologist	19-1020.01	Biologists
8.50150	Pharmaceutical Scientist	19-1042.00	Medical Scientists, Except Epidemiologists
8.50160	Quality Assurance Technician	15-3011.00	Mathematical Technicians
8.50170	Quality Control Technician	15-3011.00	Mathematical Technicians
8.50180	Regulatory Affairs Specialist	29-9011.00	Occupational Health and Safety Specialists
8.50180	Regulatory Affairs Specialist	29-9012.00	Occupational Health and Safety Technicians
8.50190	Research Assistant	31-9093.00	Medical Equipment Preparers
8.50200	Research Associate	19-1042.00	Medical Scientists, Except Epidemiologists
8.50210	Research Scientist	19-1042.00	Medical Scientists, Except Epidemiologists
8.50220	Toxicologist	19-1042.00	Medical Scientists, Except Epidemiologists

Section V – Cluster Profile
Advisory Committee List

HEALTH SCIENCE

Lead Organization: National Consortium on Health Science and Technology Education (NCHSTE)

Contact info:
Scott Snelson
Utah State Office of Education
250 East 500 South
Salt lake City, Utah 84111
Phone 801/538-7889
ssnelson@usoe.k12.ut.us

Health Science Career Cluster
Advisory Consortium
(March 7, 2002)

Therapeutic Services Pathway Representation

Career Specialty	Participant	Organization/Employer
Athletic Trainer	Lara Skaggs	OK Department of Career & Tech Ed
Dental	Beverly Campbell Ruthie Carpenter	CA Department of Education AL Department of Education
Emergency Medical Technician	Carole Clark	MI Department of Education
Exercise Science	Scott Snelson	UT Department of Education
Nursing	Shirley Craft Sharon Norman Judy Conlin Regina St. George Kathryn Torricelli Diane Sharp Roanne Seeley Shelly Wehmeyer Carole Stacy Linda Cutler Andie Fredrick Nancy Allen Catherine Vance Karen Batchelor Becky Davis	AZ Department of Education Blue Ridge AHEC, GA FL Department of Education GA Department of Education IL Department of Education KY Department of Education ME Department of Education MO Department of Education MI Health Council NH Department of Education Phenix – HST Health Academy SC Department of Education IA Department of Education TX Department of Education WV Department of Education
Pharmacy	Mike Phillips	Sutter Health
Rehabilitation Therapy	Karen Wheelock	ME Center for Integrated Rehabilitation
Respiratory	Don Richards	KS Board of Regents

Diagnostic Services Pathway Representation

Career Specialty	Participant	Organization/Employer
Biotechnology	Diane MiraCosta Kamal Rashid	CA Utah State University
Clinical Laboratory Science	Kathy Doig Clarice Morris	Michigan State University Yonkers Public Schools
Imaging	Ginger Griffin Sal Martino	American Society of Radiologic Tech American Society of Radiologic Tech
Nuclear Medicine	Art Hall Kristen Waterstram-Rich	Capintec, Incorporated Society of Nuclear Medicine

Health Science Career Cluster
Advisory Consortium
(March 7, 2002)

Information Services Pathway Representation

Career Specialty	Participant	Organization/Employer
Administration	Maureen Boshier Laurene McLemore	NM Hospitals & Health Systems Assoc TN Department of Education
Health Education	Loretta Maldaner	KY AHEC
Human Resources	Judy Hansen Mary Anne Kelly	Kaiser Permanente American Hospital Association
Medical Informatics	Karen Minenella	Schoolcraft Community College
Medical Transcription	Melba Lee	CT AHEC
Public Health	Sharon Barrett	US Depart of Health & Human Services
Social Worker	Mike Mitchell	MN Department of Education

Environmental Services Pathway Representation

Career Specialty	Participant	Organization/Employer
Central Service	Bruce Bird	International Association of Healthcare
Sanitary Management	Patti Concello	Am. Society of Housekeeping Managers

Biotechnology	Jeffery O'Neal	North Valley & Mountain Biotechnology American River College
Biotechnology	Kamal Rashid	Biotechnology Center Utah State University

Section VI – Credentials

Deliverable #2: Health Science sample list of existing credentials
(Includes licenses, education and industry certificates, as well as postsecondary degree options)
Updated: August 25, 2002

Education and Industry *Licenses*		
Title/Type/Descriptor of Licensing Program	**Licensing Organization**	**Source for Contact Information**
Therapeutic Careers		
Athletic Trainer	Licensure required by some states	Simmers, Louise. Diversified Health Occupations 5th Ed., Delmar Thomson Learning 2001
Audiologist	State Licensing Boards	Health Professions Career and Education Directory 29th Edition 2001-2002 published by the AMA Press
Chiropractor	State Licensing Boards	**http://stats.bls.gov/oco/ocos071.htm**
Dental Assistant	Some states require licensure	Health Professions Career and Education Directory 29th Edition 2001-2002 published by the AMA Press
Dental Hygienist	State Licensing Boards, Dental Hygiene National Board	Health Professions Career and Education Directory 29th Edition 2001-2002 published by the AMA Press
Dentist	Licensure required in state of practice	Simmers, Louise. Diversified Health Occupations 5th Ed., Delmar Thomson Learning 2001
Dietician	Licensure required in many states	Simmers, Louise. Diversified Health Occupations 5th Ed., Delmar Thomson Learning 2001
Dosimetrist (see also Radiology Technology)	Licensure required by many states	Health Technologists, Technicians and Healthcare Support Occupations. February 2002. Reprinted from the Occupation Outlook Handbook 2002-2003 Edition. US Department of Labor, Bureau of Labor Statistics
Pharmacy Technician	Licensure required in many states	Simmers, Louise. Diversified Health Occupations 5th Ed., Delmar Thomson Learning 2001
Physical Therapist	State Government Agencies administering a national exam	Health Professions Career and Education Directory 29th Edition 2001-2002 published by the AMA Press
Physical Therapy Assistant	License required in some states	Health Technologists, Technicians and Healthcare Support Occupations. February 2002 Reprinted from the Occupation Outlook Handbook 2002-2003 Edition. US Department of Labor, Bureau of Labor Statistics p.35

Physician MD/DO	Licensure required in state of practice	Simmers, Louise. Diversified Health Occupations 5th Ed., Delmar Thomson Learning 2001
Physician's Assistant	Licensure required	Health Professions Career and Education Directory 29th Edition 2001-2002 published by the AMA Press
Psychologist	Licensure required	Simmers, Louise. Diversified Health Occupations 5th Ed., Delmar Thomson Learning 2001
Licensed Practical Nurse (Licensed Vocational Nurse)	License required in many states	Health Professions Career and Education Directory 29th Edition 2001-2002 published by the AMA Press
Massage Therapist	Licensure required in many states	Simmers, Louise. Diversified Health Occupations 5th Ed., Delmar Thomson Learning 2001
Mortician	Licensure required	Simmers, Louise. Diversified Health Occupations 5th Ed., Delmar Thomson Learning 2001
Occupational Therapist	Licensure required	Simmers, Louise. Diversified Health Occupations 5th Ed., Delmar Thomson Learning 2001
Occupational Therapy Assistant	Licensure required in many states	Simmers, Louise. Diversified Health Occupations 5th Ed., Delmar Thomson Learning 2001
Optometrist	Licensure required	Simmers, Louise. Diversified Health Occupations 5th Ed., Delmar Thomson Learning 2001
Paramedic	Licensure required	Simmers, Louise. Diversified Health Occupations 5th Ed., Delmar Thomson Learning 2001
Pharmacist	Licensure required	Simmers, Louise. Diversified Health Occupations 5th Ed., Delmar Thomson Learning 2001
Recreation Therapist	Licensure required in some states	Simmers, Louise. Diversified Health Occupations 5th Ed., Delmar Thomson Learning 2001
Registered Nurse	Licensure required	Simmers, Louise. Diversified Health Occupations 5th Ed., Delmar Thomson Learning 2001
Respiratory Therapist	Licensure required	Simmers, Louise. Diversified Health Occupations 5th Ed., Delmar Thomson Learning 2001
Social Worker	Licensure required	Simmers, Louise. Diversified Health Occupations 5th Ed., Delmar Thomson Learning 2001
Speech Language Pathologist	Licensure required in most states	Simmers, Louise. Diversified Health Occupations 5th Ed., Delmar Thomson Learning 2001
Veterinarian	Licensure required	Simmers, Louise. Diversified Health Occupations 5th Ed., Delmar Thomson Learning 2001

Diagnostic Careers		
Computer Tomography (CT) Technologist (See also Radiology Technology)	Licensure required in many states	Health Technologists, Technicians and Healthcare Support Occupations.February 2002. Reprinted from the Occupation Outlook Handbook 2002-2003 Edition. US Department of Labor, Bureau of Labor Statisticsp. 37
Cytogenic Technologist	Licensure required in some states	Health Technologists, Technicians and Healthcare Support Occupations.February 2002. Reprinted from the Occupation Outlook Handbook 2002-2003 Edition. US Department of Labor, Bureau of Labor Statistics, p. 5
Cytotechnologist	Licensure required in some states	Health Technologists, Technicians and Healthcare Support Occupations. February 2002. Reprinted from the Occupation Outlook Handbook 2002-2003 Edition. US Department of Labor, Bureau of Labor Statistics p. 5
Histotechnician	License required in many states	Health Technologists, Technicians and Healthcare Support Occupations. February 2002. Reprinted from the Occupation Outlook Handbook 2002-2003 Edition. US Department of Labor, Bureau of Labor Statistics,p. 5
Histotechnologist	License required in many states	Health Technologists, Technicians and Healthcare Support Occupations. February 2002. Reprinted from the Occupation Outlook Handbook 2002-2003 Edition. US Department of Labor, Bureau of Labor Statistics,p. 5
Magnetic Resonance Technologist (MRI) (see also Radiology Technology)	License required in many states	Health Technologists, Technicians and Healthcare Support Occupations. February 2002.Reprinted from the Occupation Outlook Handbook 2002-2003 Edition. US Department of Labor, Bureau of Labor Statistics, p. 37
Mammographer (See also Radiology Technology)	License required in many states	Health Technologists, Technicians and Healthcare Support Occupations.February 2002. Reprinted from the Occupation Outlook Handbook 2002-2003 Edition. US Department of Labor, Bureau of Labor Statistics. p. 37
Medical Technologist (Clinical Lab Scientist)	License required in many states	Health Technologists, Technicians and Healthcare Support Occupations. February 2002. Reprinted from the Occupation Outlook Handbook 2002-2003 Edition. US Department of Labor, Bureau of Labor Statistics,p. 5

Pathologist	Licensure required in state of practice	Simmers, Louise. Diversified Health Occupations 5th Ed., Delmar Thomson Learning 2001
Radiologic Technologist (Radiographer) (Radiology Technology)	Licensure required by many states	Health Technologists, Technicians and Healthcare Support Occupations.February 2002. Reprinted from the Occupation Outlook Handbook 2002-2003 Edition. US Department of Labor, Bureau of Labor Statistics, p. 37
Radiologist	Licensure required in state of practice	Simmers, Louise. Diversified Health Occupations 5th Ed., Delmar Thomson Learning 2001
Health Informatics Careers		
Applied Researcher (see also Research Scientist)	Licensure required in state of practice if one has medical degree	http://stats.bls.gov/oco
Health Educator	Licensure will vary per state – may need teacher's license, will also need licensure depending on health occupations background such as nursing.	
Health Care Administrator	Licensure required for long-term care facilities.	Simmers, Louise. Diversified Health Occupations 5th Ed., Delmar Thomson Learning 2001
Public Health Educator	Licensure will vary per state – may need teacher's license, will also need licensure depending on health occupations background such as nursing.	
Social Worker	License required	Simmers, Louise. Diversified Health Occupations 5th Ed., Delmar Thomson Learning 2001
Biotechnology Research and Development Careers		
Clinical Lab Technician	License required by some states	Health Technologists, Technicians and Healthcare Support Occupations. February 2002. Reprinted from the Occupation Outlook Handbook 2002-2003 Edition. US Department of Labor, Bureau of Labor Statistics,p. 5
Research Scientist Medical Scientist (MD/PhD)	Licensure required for medical degree in state of practice	http://stats.bls.gov/oco/

Education and Industry *Certificates and Registration*		
Title/Type/Descriptor of Certification Program	**Issuing Organization**	**Source for Contact Information**
Therapeutic Careers		
Acupuncturist	Certification by the National Commission for Certification of Acupuncturists	www.aaom.org
Anesthesiologist Assistant	Certification by the National Commission for Certification of Anesthesiology Assistants	Health Professions Career and Education Directory 29th Edition 2001-2002 published by the AMA Press
Art/Music/Dance Therapist	Registration/Certification by the Art Therapy Credentials Boards	Health Professions Career and Education Directory 29th Edition 2001-2002 published by the AMA Press, www.atcb.org
Athletic Trainer	Certification by the National Athletic Trainers Association Board of Certification	Health Professions Career and Education Directory 29th Edition 2001-2002 published by the AMA Press, www.nataboc.org
Audiologist	Certification by the American Speech-Language-Hearing Association	Health Professions Career and Education Directory 29th Edition 2001-2002 published by the AMA Press
Certified Nurse Assistant	State certification and State registry	Health Technologists, Technicians, and Health Care Support Occupations. Reprinted from the Occupational Outlook Handbook 2002-2002 Edition US Dept of Labor 2002-2003 Edition by he U.S. Department of Labor and the Bureau of Labor Statistics p.24

Chiropractor	Clinical specialty certification available by specialty councils	http://stats.bls.gov/oco/ocos071.htm
Dental Assistant	National Certification by the Dental Assisting National Board and State Certification	Health Professions Career and Education Directory 29th Edition 2001-2002 published by the AMA Press
Dental Hygienist	Certification by the Dental Hygiene National Boards	Health Professions Career and Education Directory 29th Edition 2001-2002 published by the AMA Press
Dental Laboratory Technician	Certification by the National Board of Certification in Dental Laboratory Technology	Health Professions Career and Education Directory 29th Edition 2001-2002 published by the AMA Press

Dentist	Certification in specialty areas	Simmers, Louise. Diversified Health Occupations 5th Ed., Delmar Thomson Learning 2001
Dietician	Certification and Registration by the Commission on Dietetic Registration	Health Professions Career and Education Directory 29th Edition 2001-2002 published by the AMA Press
Dosimetrist	Certification by the Medical Dosimetrist Certification Board Certification also available by American Society of Radiologic Technologists	www.sowega-ahec.org.htm see also the ahec website
Emergency Medical Technician	Certification by the National Registry of EMTs and State Certification	Health Professions Career and Education Directory 29th Edition 2001-2002 published by the AMA Press

Exercise Physiologist	Registration by the Clinical Exercise Physiology Practice Board. Certification by the American Society of Exercise Physiologists	www.ascm.org/rcep-public.htm www.css.edu/users/thoone2/asep/stand.htm www.nata.org
Home Health Aide	Certification or registration by the National Association for Home Care and State Certification	Health Technologists, Technicians, and Health Care Support Occupations. Reprinted from the Occupational Outlook Handbook 2002-2002 Edition US Dept of Labor 2002-2003 Edition by he U.S. Department of Labor and the Bureau of Labor Statistics , p. 24
Pharmacy Technician	Certification by the National Pharmacy Technician Certification Board	Health Technologists, Technicians, and Health Care Support Occupations. Reprinted from the Occupational Outlook Handbook 2002-2002 Edition US Dept of Labor 2002-2003 Edition by he U.S. Department of Labor and the Bureau of Labor Statistics p.34
Physical Therapist	Certification by the American Physical Therapy Association	Simmers, Louise. Diversified Health Occupations 5th Ed., Delmar Thomson Learning 2001
Physical Therapy Assistant	Certification by the American Physical Therapy Association	Simmers, Louise. Diversified Health Occupations 5th Ed., Delmar Thomson Learning 2001
Phyisician MD/DO	Certification given by specialty areas.	Simmers, Louise. Diversified Health Occupations 5th Ed., Delmar Thomson Learning 2001

Physician's Assistant	Certification by the National Commission Certification of Physician Assistants	Simmers, Louise. Diversified Health Occupations 5th Ed., Delmar Thomson Learning 2001
Psychologist	Certification for specialty areas available from the American Board of Professional Psychology	Simmers, Louise. Diversified Health Occupations 5th Ed., Delmar Thomson Learning 2001
Kinesiotherapist	Certification/Registration by the Board of Registry for Kinesiotherapy	Health Professions Career and Education Directory 29th Edition 2001-2002 published by the AMA Press
Massage Therapist	NCETMB National Certification Board for Theraputic Massage and Bodywork.	http://www.ncbtmb.com/
Medical Assistant	Certification by the American Association of Medical Assistants Registration by the American Medical Technologists State Certification	Health Professions Career and Education Directory 29th Edition 2001-2002 published by the AMA Press See also Health Technologists, Technicians, and Health Care Support Occupations. Reprinted from the Occupational Outlook Handbook 2002-2002 Edition US Dept of Labor 2002-2003 Edition by he U.S. Department of Labor and the Bureau of Labor Statistics p. 17
Mortician	National Funeral Directors Association	www.nfda.org
Occupational Therapist	Certification by the National Board for Certification in Occupational Therapy	Health Professions Career and Education Directory 29th Edition 2001-2002 published by the AMA Press, www.nbcot.org
Occupational Therapy Assistant	Certification by the National Board for Certification in Occupational Therapy	Health Professions Career and Education Directory 29th Edition 2001-2002 published by the AMA Press, www.nbcot.org
Ophthalmic Medical Personnel	Certificates from program completion	Health Technologists, Technicians, and Health Care Support Occupations. Reprinted from the Occupational Outlook Handbook 2002-2002 Edition US Dept of Labor 2002-2003 Edition by he U.S. Department of Labor and the Bureau of Labor Statistics p. 29
Optometrist	Examinations available from the National Board of Examiners in Optometry	**http://stats.bls.gov/oco/ocos073.htm**
Orthotist/Prosthetist	American Board for Certification in Orthotics and Prosthetics, Inc	Health Professions Career and Education Directory 29th Edition 2001-2002 published by the AMA Press

Paramedic	Certification/Registration by the National Registry of EMTs	Simmers, Louise. Diversified Health Occupations 5th Ed., Delmar Thomson Learning 2001
Pharmacist	State Board of Pharmacy	Simmers, Louise. Diversified Health Occupations 5th Ed., Delmar Thomson Learning 2001
Recreation Therapist	Certification required by a few states from the National Council for Therapeutic Recreation Certification	Simmers, Louise. Diversified Health Occupations 5th Ed., Delmar Thomson Learning 2001
Registered Nurse	Certification from the specialty national associations	Simmers, Louise. Diversified Health Occupations 5th Ed., Delmar Thomson Learning 2001
Respiratory Therapist	Certification/Registration by the National Board for Respiratory Care	Health Professions Career and Education Directory 29th Edition 2001-2002 published by the AMA Press
Social Worker	National Association of Social Workers or Academy of Certified Baccalaureate Social Workers	http://www.ahec.net/coweb/careerguide/SocialWorker.htm
Speech Language Pathologist	Certification by the American Speech – Language – Hearing Association	Simmers, Louise. Diversified Health Occupations 5th Ed., Delmar Thomson Learning 2001
Surgical Technician (Surgical Technologist)	Certification as a Certified Surgical Technologist (CST) or CST First Assistant (CST/CFA) by the Liaison Council on Certification for the Surgical Technologist	Health Professions Career and Education Directory 29th Edition 2001-2002 published by the AMA Press, www.lcc-st.org
Veterinarian	Board certification in speciality areas	http://stats.bls.gov/oco/ocos076.htm
Diagnostic Careers		
Cardiovascular Technologist	Certification/Registration by the Cardiovascular Credentialing International or Registration by the American Registry of Diagnostic Medical Sonographers	Health Professions Career and Education Directory 29th Edition 2001-2002 published by the AMA Press See also Health Technologists, Technicians, and Health Care Support Occupations. Reprinted from the Occupational Outlook Handbook 2002-2002 Edition US Dept of Labor 2002-2003 Edition by he U.S. Department of Labor and the Bureau of Labor Statistics p.3

Clinical Lab Technician	Certification by the American Society for Clinical Laboratory Science and/or the American Medical Technologists Association	Health Professions Career and Education Directory 29th Edition 2001-2002 published by the AMA Press
Computer Tomography (CT) Technologist (See also Radiology Technology)	Certification by the American Registry of Radiologic Technologists	Health Professions Career and Education Directory 29th Edition 2001-2002 published by the AMA Press
Cytogenic Technologist	Certification by American Medical Technologists and/or the National Credentialing Agency for Laboratory Workers	Health Technologists, Technicians, and Health Care Support Occupations. Reprinted from the Occupational Outlook Handbook 2002-2002 Edition US Dept of Labor 2002-2003 Edition by he U.S. Department of Labor and the Bureau of Labor Statistics p.5
Cytotechnologist	Certification/Registration by the Board of Registry of the American Society for Clinical Pathology and/or the Board of Registry of the American Association of Bioanalysts	Health Professions Career and Education Directory 29th Edition 2001-2002 published by the AMA Press, Health Technologists, Technicians, and Health Care Support Occupations. Reprinted from the Occupational Outlook Handbook 2002-2002 Edition US Dept of Labor 2002-2003 Edition by he U.S. Department of Labor and the Bureau of Labor Statistics p.5
Diagnostic Medical Sonographer	Registration by the American Registry of Diagnostic Medical Sonographers	Health Professions Career and Education Directory 29th Edition 2001-2002 published by the AMA Press
Electrocardiographic (ECG) Technician	Certification by the National Board of Cardiovascular Testing	Simmers, Louise. Diversified Health Occupations 5th Ed., Delmar Thomson Learning 2001
Electronic Diagnostic Technologist (EEG) (see also Electroneurodiagnostic Technologist)	Certification/Registration by the American Board of Electroencephalographic Technologists	Health Professions Career and Education Directory 29th Edition 2001-2002 published by the AMA Press
Exercise Physiologist	Registration by the Clinical Exercise Physiology Practice Board. Certification by the American Society of Exercise Physiologists	www.ascm.org/rcep-public.html www.css.edu/users/thoone2/asep/stand.htm www.nata.org
Histotechnician	Certification by the American Society of Clinical Pathologists	http://www.ahec.net/coweb/careerguide/Histologytech.htm

Histotechnologist	Certification by the American Society of Clinical Pathologists	http://www.ahec.net/coweb/careerguide/Histologytech.htm
Magnetic Resonance Technologist (MRI) (see also Radiology Technology)	Certification by the American Registry of Radiologic Technologists	Health Professions Career and Education Directory 29th Edition 2001-2002 published by the AMA Press,
Mammographer (See also Radiology Technology)	Certification by the American Registry of Radiologic Technologists	Health Professions Career and Education Directory 29th Edition 2001-2002 published by the AMA Press,
Medical Technologist (Clinical Lab Scientist)	Certification by the American Society for Clinical Laboratory Science and/or the American Medical Technologists Association	Health Professions Career and Education Directory 29th Edition 2001-2002 published by the AMA Press,
Nuclear Medicine Technologist	Certification by the Nuclear Medicine Technology Certification Board, Registration or certification by the American Registry of Radiologic Technologies	Health Professions Career and Education Directory 29th Edition 2001-2002 published by the AMA Press, Health Technologists, Technicians, and Health Care Support Occupations. Reprinted from the Occupational Outlook Handbook 2002-2002 Edition US Dept of Labor 2002-2003 Edition by he U.S. Department of Labor and the Bureau of Labor Statistics p. 22
Nutritionist	Certification by the Commission on Dietetic Registration	Health Professions Career and Education Directory 29th Edition 2001-2002 published by the AMA Press
Pathologist	Board Certification in area of specialty	Health Professions Career and Education Directory 29th Edition 2001-2002 published by the AMA Press,
Pathology Assistant	Certification by the National Commission of Physician's Assistants	Simmers, Louise. Diversified Health Occupations 5th Ed., Delmar Thomson Learning 2001
Phlebotomist	Certification available from the American Society of Clinical Pathologists, the International Academy of Phlebotomy Sciences Inc., the National Certification Agency, and the National Phlebotomy Association	http://www.moraine.cc.il.us/HealthSciences/Phlebotomy/more_Phlebotomy.htm
Positron Emission Tomography (PET) Tehcnologist	Certification/Registration by the American Registry of Radiologic Technologists	Health Professions Career and Education Directory 29th Edition 2001-2002 published by the AMA Press,
Radiologic Technologist (Radiographer)	Certification/Registration by the American Registry of Radiologic Technologists	Certification/Registration by the American Registry of Radiologic Technologists

Radiologist	Board Certification in area of specialty	Health Professions Career and Education Directory 29th Edition 2001-2002 published by the AMA Press,

Health Informatics Careers		
Ethicist	Certificate in Bioethics available as a degree option	http://www.midwestern.edu/Pages/MBEG.html
Health Educator	School health educator must have state teachers certification. Certification by the National Commission for Health Education Credentialing, Inc.	http://www.ahec.net/coweb/careerguide/HealthEducator.htm
Health Information Coder	Certification by the American Health Information Management Association	Simmers, Louise. Diversified Health Occupations 5th Ed., Delmar Thomson Learning 2001
Health Information Services (Technician? Administration?)	Registration by the American Health Information Management Association	Simmers, Louise. Diversified Health Occupations 5th Ed., Delmar Thomson Learning 2001
Health Care Administrator	Certification by the American College of Health Care Executives	Simmers, Louise. Diversified Health Occupations 5th Ed., Delmar Thomson Learning 2001
Medical Assistant	Certification by the American Association of Medical Assistants Registration by the American Medical Technologists	Health Professions Career and Education Directory 29th Edition 2001-2002 published by the AMA Press See also Simmers, Louise. Diversified Health Occupations 5th Ed., Delmar Thomson Learning 2001
Medical Biller/Patient Financial Services	Certification by the American Health Information Management Association	Simmers, Louise. Diversified Health Occupations 5th Ed., Delmar Thomson Learning 2001
Medical Information Technologist	Certification by the American Health Information Management Association	Simmers, Louise. Diversified Health Occupations 5th Ed., Delmar Thomson Learning 2001
Medical Librarian/Cybrarian	Memberships available in the Medical Library Associations Academy of Health Information Professionals	http://www.ahec.net/coweb/careerguide/HealthScienceLibrarian.htm
Reimbursement Specialist (HFMA)	Certification by the American Health Information Management Association	Simmers, Louise. Diversified Health Occupations 5th Ed., Delmar Thomson Learning 2001

Risk Management	Certification by the American Society for Healthcare Risk Management	http://www.ashrm.org/ClientSide/memberbrochure/learn.asp
Social Worker	Specialty certification available from the National Association of Social Workers	http://www.naswdc.org/credentials/specialty.asp
Transcriptionist	Certification by the American Association for Medical Transcription	Health Technologists, Technicians, and Health Care Support Occupations. Reprinted from the Occupational Outlook Handbook 2002-2002 Edition US Dept of Labor 2002-2003 Edition by he U.S. Department of Labor and the Bureau of Labor Statistics p. 20
Support Services Careers		
Biomedical Clinical Engineer	Certification from the AmericanBboard of ClinicalEngineers or from the Association for the Advancement of Medical Instrumentation	www.ahec.net/coweb/careerguide/biomedicalengineer.htm
Facilities Manager	Purchasing certification by the American Purchasing Society	http://stats.bls.gov/oco/ocos023.htm
Food Service	Managers certification by the Food Service Management Professionals	http://stats.bls.gov/oco/ocos024.htm
Industrial Hygienist	Certification by the Board of Certified Safety Professionals and the American Board of Industrial Hygiene	Health Technologists, Technicians, and Health Care Support Occupations. Reprinted from the Occupational Outlook Handbook 2002-2002 Edition US Dept of Labor 2002-2003 Edition by he U.S. Department of Labor and the Bureau of Labor Statistics p. 26
Biotechnology Research and Development Careers		
Geneticist	Certification by the American Board of Medical Genetics depending on area of expertise	http://wwww.faseb.org/genetics/certify.htm
Quality Assurance Technician	Certification by the American Society for Quality Control Certified Medical Inspector and/or Certified Quality Technician	http://www.tc.cc.va.us/programs/ot/eit/qualasu.htm
Quality Control Technician	Certification by the American Society for Quality Control Certified Medical Inspector and/or Certified Quality Technician	http://www.tc.cc.va.us/programs/ot/eit/qualassu.htm

Post-Secondary Degree Options		
Title/Type/Descriptor of Licensing Program	**Licensing Organization**	**Source for Contact Information**
Therapeutic Careers		
Acupuncturist	Acupuncture schools and colleges	http://www.aaom.org/aboutaaom.html
Anesthesiologist Assistant	Colleges and Universities	Health Professions Career and Education Directory 29th Edition 2001-2002 published by the AMA Press, p. 2
Art/Music/Dance Therapist	Colleges and Universities	Simmers, Louise, M.Ed., R.N. Diversified Health Occupations 5th Edition, Delmar Thomson Learning, New York 2001, p. 44
Athletic Trainer	Colleges and Universities	Health Professions Career and Education Directory 29th Edition 2001-2002 published by the AMA Press, p. 7
Audiologist	Colleges and Universities	Simmers, Louise, M.Ed., R.N. Diversified Health Occupations 5th Edition, Delmar Thomson Learning, New York 2001, p. 44
Certified Nurse Assistant	High School Programs, Voc-Tech Schools, Colleges, and Nursing Homes	Health Technologists, Technicians, and Health Care Support Occupations. Reprinted from the Occupational Outlook Handbook, 2002-2003 Edition. U.S. Department of Labor, Bureau of Labor Statistics. February 2002, Bulletin 2540-9, p. 24
Chiropractor	Colleges and Universities	http://stats.bls.gov/oco/text/ocos071.txt
Dental Assistant	OTJ, Colleges, Voc-Tech Programs, Military	Health Technologists, Technicians, and Health Care Support Occupations. Reprinted from the Occupational Outlook Handbook, 2002-2003 Edition. U.S. Department of Labor, Bureau of Labor Statistics. February 2002, Bulletin 2540-9, p. 7
Dental Hygienist	Colleges and Universities	Health Technologists, Technicians, and Health Care Support Occupations. Reprinted from the Occupational Outlook Handbook, 2002-2003 Edition. U.S. Department of Labor, Bureau of Labor Statistics. February 2002, Bulletin 2540-9, p. 8

Dental Laboratory Technician	OTJ, Colleges, Voc-Tech Programs, Military	Health Technologists, Technicians, and Health Care Support Occupations. Reprinted from the Occupational Outlook Handbook, 2002-2003 Edition. U.S. Department of Labor, Bureau of Labor Statistics. February 2002, Bulletin 2540-9, p. 10
Dentist	Colleges and Universities	Simmers, Louise, M.Ed., R.N. Diversified Health Occupations 5th Edition, Delmar Thomson Learning, New York 2001, p. 25
Dietician	Colleges and Universities	Simmers, Louise, M.Ed., R.N. Diversified Health Occupations 5th Edition, Delmar Thomson Learning, New York 2001, p. 41
Dosimetrist (see also Nuclear Medicine Technologist)	Colleges and Universities	Health Professions Career and Education Directory 29th Edition 2001-2002 published by the AMA Press, p. 229
Emergency Medical Technician	Colleges, Voc-Tech Programs	Health Technologists, Technicians, and Health Care Support Occupations. Reprinted from the Occupational Outlook Handbook, 2002-2003 Edition. U.S. Department of Labor, Bureau of Labor Statistics. February 2002, Bulletin 2540-9, p. 14

Exercise Physiologist	Colleges, Universities, Vocational Programs	http://members.aol.com_ht_a/insitumed/myhomepage/business.html?mtbrand=AOL_US
Home Health Aide	High School Programs, Voc-Tech Programs, Colleges, Nursing Homes	Health Technologists, Technicians, and Health Care Support Occupations. Reprinted from the Occupational Outlook Handbook, 2002-2003 Edition. U.S. Department of Labor, Bureau of Labor Statistics. February 2002, Bulletin 2540-9, p. 24
Pharmacy Technician	Military, Hospitals, Colleges, Voc-Tech Programs, Colleges	Health Technologists, Technicians, and Health Care Support Occupations. Reprinted from the Occupational Outlook Handbook, 2002-2003 Edition. U.S. Department of Labor, Bureau of Labor Statistics. February 2002, Bulletin 2540-9, p. 33
Physical Therapist	Colleges and Universities	Health Professions Career and Education Directory 29th Edition 2001-2002 published by the AMA Press, p. 270
Physical Therapy Assistant	Colleges and Universities	Health Technologists, Technicians, and Health Care Support Occupations. Reprinted from the Occupational Outlook Handbook, 2002-2003 Edition. U.S. Department of Labor, Bureau of Labor Statistics. February 2002, Bulletin 2540-9, p. 35

Phyisician MD/DO	Colleges and Universities	Simmers, Louise, M.Ed., R.N. Diversified Health Occupations 5th Edition, Delmar Thomson Learning, New York 2001, p. 35
Physician's Assistant	Colleges and Universities	Health Professions Career and Education Directory 29th Edition 2001-2002 published by the AMA Press, p. 296
Psychologist	Colleges and Universities	Simmers, Louise, M.Ed., R.N. Diversified Health Occupations 5th Edition, Delmar Thomson Learning, New York 2001, p. 36
Kinesiotherapist	Colleges and Universities	Health Professions Career and Education Directory 29th Edition 2001-2002 published by the AMA Press, p. 190
Licensed Practical Nurse	Voc-Tech Programs, Colleges, Universities, and Hospitals	Health Technologists, Technicians, and Health Care Support Occupations. Reprinted from the Occupational Outlook Handbook, 2002-2003 Edition. U.S. Department of Labor, Bureau of Labor Statistics. February 2002, Bulletin 2540-9, p. 15
Massage Therapist	Certified Programs (Colleges)	Simmers, Louise, M.Ed., R.N. Diversified Health Occupations 5th Edition, Delmar Thomson Learning, New York 2001, p. 43
Medical Assistant	Voc-Tech Programs, High Schools, Colleges	Health Technologists, Technicians, and Health Care Support Occupations. Reprinted from the Occupational Outlook Handbook, 2002-2003 Edition. U.S. Department of Labor, Bureau of Labor Statistics. February 2002, Bulletin 2540-9, p. 17
Mortician	Colleges and Universities	Simmers, Louise, M.Ed., R.N. Diversified Health Occupations 5th Edition, Delmar Thomson Learning, New York 2001, p. 38
Occupational Therapist	Colleges and Universities	Health Professions Career and Education Directory 29th Edition 2001-2002 published by the AMA Press, p. 236
Occupational Therapy Assistant	Colleges, Technical Schools	Health Technologists, Technicians, and Health Care Support Occupations. Reprinted from the Occupational Outlook Handbook, 2002-2003 Edition. U.S. Department of Labor, Bureau of Labor Statistics. February 2002, Bulletin 2540-9, p. 28

Ophthalmic Medical Personnel	Colleges, Universities, and Hospitals	Health Professions Career and Education Directory 29th Edition 2001-2002 published by the AMA Press, p. 261
Optometrist	Colleges and Universities	Simmers, Louise, M.Ed., R.N. Diversified Health Occupations 5th Edition, Delmar Thomson Learning, New York 2001, p. 48
Orthotist/Prosthetist	Hospitals, Universities	Health Professions Career and Education Directory 29th Edition 2001-2002 published by the AMA Press, p. 263
Paramedic	Colleges	Health Technologists, Technicians, and Health Care Support Occupations. Reprinted from the Occupational Outlook Handbook, 2002-2003 Edition. U.S. Department of Labor, Bureau of Labor Statistics. February 2002, Bulletin 2540-9, p. 14
Pharmacist	Colleges and Universities	Simmers, Louise, M.Ed., R.N. Diversified Health Occupations 5th Edition, Delmar Thomson Learning, New York 2001, p. 43
Recreation Therapist	Colleges and Universities	Health Professions Career and Education Directory 29th Edition 2001-2002 published by the AMA Press, p. 396
Registered Nurse	Colleges, Universities, and Hospitals	Simmers, Louise, M.Ed., R.N. Diversified Health Occupations 5th Edition, Delmar Thomson Learning, New York 2001, p. 39
Respiratory Therapist	Colleges, Universities, and Hospitals	Health Professions Career and Education Directory 29th Edition 2001-2002 published by the AMA Press, p. 353
Social Worker	Colleges and Universities	Simmers, Louise, M.Ed., R.N. Diversified Health Occupations 5th Edition, Delmar Thomson Learning, New York 2001, p. 36
Speech Language Pathologist	Colleges and Universities	Simmers, Louise, M.Ed., R.N. Diversified Health Occupations 5th Edition, Delmar Thomson Learning, New York 2001, p. 44
Surgical Technician (Surgical Technologist)	Colleges, Voc-Tech Programs, Universities, Hospitals, Military	Health Technologists, Technicians, and Health Care Support Occupations. Reprinted from the Occupational Outlook Handbook, 2002-2003 Edition. U.S. Department of Labor, Bureau of Labor Statistics. February 2002, Bulletin 2540-9, p. 38

Veterinarian	Colleges and Universities	Simmers, Louise, M.Ed., R.N. Diversified Health Occupations 5th Edition, Delmar Thomson Learning, New York 2001, p. 47
Veterinarian Technician	Colleges and Universities	Simmers, Louise, M.Ed., R.N. Diversified Health Occupations 5th Edition, Delmar Thomson Learning, New York 2001, p. 47

Diagnostic Careers		
Cardiovascular Technologist	Colleges	Health Technologists, Technicians, and Health Care Support Occupations. Reprinted from the Occupational Outlook Handbook, 2002-2003 Edition. U.S. Department of Labor, Bureau of Labor Statistics. February 2002, Bulletin 2540-9, p. 3
Clinical Lab Technician	Colleges, Military, Technical Schools, Hospitals,	Health Technologists, Technicians, and Health Care Support Occupations. Reprinted from the Occupational Outlook Handbook, 2002-2003 Edition. U.S. Department of Labor, Bureau of Labor Statistics. February 2002, Bulletin 2540-9, p. 5
Computer Tomography (CT) Technologist (See also Radiology Technology)	Hospitals, Colleges, Universities, Military, Voc-Tech Programs	Health Technologists, Technicians, and Health Care Support Occupations. Reprinted from the Occupational Outlook Handbook, 2002-2003 Edition. U.S. Department of Labor, Bureau of Labor Statistics. February 2002, Bulletin 2540-9, p. 37

Cytogenic Technologist	Colleges, Universities, and Hospitals	Health Technologists, Technicians, and Health Care Support Occupations. Reprinted from the Occupational Outlook Handbook, 2002-2003 Edition. U.S. Department of Labor, Bureau of Labor Statistics. February 2002, Bulletin 2540-9, p. 5
Cytotechnologist	Colleges, Universities, and Hospitals	Health Technologists, Technicians, and Health Care Support Occupations. Reprinted from the Occupational Outlook Handbook, 2002-2003 Edition. U.S. Department of Labor, Bureau of Labor Statistics. February 2002, Bulletin 2540-9, p. 5
Diagnostic Medical Sonographer	Hospitals, Voc-Tech Programs, Military, Colleges, Universities	Health Technologists, Technicians, and Health Care Support Occupations. Reprinted from the Occupational Outlook Handbook, 2002-2003 Edition. U.S. Department of Labor, Bureau of Labor Statistics. February 2002, Bulletin 2540-9, p. 12, see also http://stats.bls.gov/oco/ocos273/htm
Electrocardiographic (ECG) Technician	OTJ, Voc-Tech Programs	Health Technologists, Technicians, and Health Care Support Occupations. Reprinted from the Occupational Outlook Handbook, 2002-2003 Edition. U.S. Department of Labor, Bureau of Labor Statistics. February 2002, Bulletin 2540-9, p. 3
Electronic Diagnostic Technologist (EEG) (see also ElectroneurodiagnosticTechnologist)	Colleges, Technical Centers, Hospitals/Medical Centers	Health Professions Career and Education Directory 29th Edition 2001-2002 published by the AMA Press, p. 160

Exercise Physiologist	Colleges, Universities, Vocational Programs	http://members.aol.com_ht_a/insitumed/myhomepage/business.html?mtbrand=AOL_US
Histotechnician	Colleges, Voc-Tech Programs, Hospitals	Health Technologists, Technicians, and Health Care Support Occupations. Reprinted from the Occupational Outlook Handbook, 2002-2003 Edition. U.S. Department of Labor, Bureau of Labor Statistics. February 2002, Bulletin 2540-9, p. 5
Histotechnologist	Colleges, Universities, and Hospitals	Health Technologists, Technicians, and Health Care Support Occupations. Reprinted from the Occupational Outlook Handbook, 2002-2003 Edition. U.S. Department of Labor, Bureau of Labor Statistics. February 2002, Bulletin 2540-9, p. 5
Magnetic Resonance Technologist (MRI) (see also Radiology Technology)	Hospitals, Colleges, Universities, Military, Voc-Tech Programs	Health Technologists, Technicians, and Health Care Support Occupations. Reprinted from the Occupational Outlook Handbook, 2002-2003 Edition. U.S. Department of Labor, Bureau of Labor Statistics. February 2002, Bulletin 2540-9, p. 37
Mammorapher (See also Radiology Technology)	Hospitals, Colleges, Universities, Military, Voc-Tech Programs	Health Technologists, Technicians, and Health Care Support Occupations. Reprinted from the Occupational Outlook Handbook, 2002-2003 Edition. U.S. Department of Labor, Bureau of Labor Statistics. February 2002, Bulletin 2540-9, p. 37
Medical Technologist (Clinical Lab Scientist)	Colleges, Universities, Hospitals	Health Technologists, Technicians, and Health Care Support Occupations. Reprinted from the Occupational Outlook Handbook, 2002-2003 Edition. U.S. Department of Labor, Bureau of Labor Statistics. February 2002, Bulletin 2540-9, p. 5
Nuclear Medicine Technologist	Colleges, Universities, and Hospitals	Health Technologists, Technicians, and Health Care Support Occupations. Reprinted from the Occupational Outlook Handbook, 2002-2003 Edition. U.S. Department of Labor, Bureau of Labor Statistics. February 2002, Bulletin 2540-9, p. 22
Nutritionist	Colleges and Universities	Health Professions Career and Education Directory 29th Edition 2001-2002 published by the AMA Press, p. 132

Pathologist	Colleges and Universities	Simmers, Louise, M.Ed., R.N. Diversified Health Occupations 5th Edition, Delmar Thomson Learning, New York 2001, p. 35
Pathology Assistant	Colleges and Universities	Health Professions Career and Education Directory 29th Edition 2001-2002 published by the AMA Press, p. 36, see also www.pathologistsassitants.org
Phlebotomist	OTJ, HOE Program, Hospitals	Simmers, Louise, M.Ed., R.N. Diversified Health Occupations 5th Edition, Delmar Thomson Learning, New York 2001, p. 27 (Hospital added)
Positron Emission Tomography (PET) Technologist	Hospital, Colleges, Universities, Military, Voc-Tech Programs	http://stats.bls.gov/oco/ocos105.html
Radiologic Technologist (Radiographer)	Hospitals, Colleges, Universities, Military, Voc-Tech Programs	Health Technologists, Technicians, and Health Care Support Occupations. Reprinted from the Occupational Outlook Handbook, 2002-2003 Edition. U.S. Department of Labor, Bureau of Labor Statistics. February 2002, Bulletin 2540-9, p. 37
Radiologist	Colleges and Universities	Simmers, Louise, M.Ed., R.N. Diversified Health Occupations 5th Edition, Delmar Thomson Learning, New York 2001, p. 35
Health Informatics Careers		
Admitting Clerk	HOE Programs, Voc-Tech Porgrams, OTJ	Simmers, Louise, M.Ed., R.N. Diversified Health Occupations 5th Edition, Delmar Thomson Learning, New York 2001, p. 33
Community Services Specialist (Counselor)	Colleges and Universities	Health Professions Career and Education Directory 29th Edition 2001-2002 published by the AMA Press, p. 72
Data Analyst	Colleges and Universities	Occupational Outlook Handbook, O*NET 15-2031.00
Epidemiologist	Colleges and Universities	Occupational Outlook Handbook, O*NET 15-2031.00
Ethicist	Colleges and Universities	http://midwestern.edu/Pages/MBEG.html

Health Information Coder	Colleges, OTJ, Medical Assistants	Health Technologists, Technicians, and Health Care Support Occupations. Reprinted from the Occupational Outlook Handbook, 2002-2003 Edition. U.S. Department of Labor, Bureau of Labor Statistics. February 2002, Bulletin 2540-9, p. 18, (Medical Assistants added)
Health Information Services (Technician? Administration?)	Colleges, OTJ	Health Technologists, Technicians, and Health Care Support Occupations. Reprinted from the Occupational Outlook Handbook, 2002-2003 Edition. U.S. Department of Labor, Bureau of Labor Statistics. February 2002, Bulletin 2540-9, p. 18
Health Care Administrator	Colleges and Universities	Simmers, Louise, M.Ed., R.N. Diversified Health Occupations 5th Edition, Delmar Thomson Learning, New York 2001, p. 33
Medical Assistant	Voc-Tech Programs, High Schools, Colleges	Health Technologists, Technicians, and Health Care Support Occupations. Reprinted from the Occupational Outlook Handbook, 2002-2003 Edition. U.S. Department of Labor, Bureau of Labor Statistics. February 2002, Bulletin 2540-9, p. 17
Medical Biller/Patient Financial Services	Colleges, OTJ	Health Technologists, Technicians, and Health Care Support Occupations. Reprinted from the Occupational Outlook Handbook, 2002-2003 Edition. U.S. Department of Labor, Bureau of Labor Statistics. February 2002, Bulletin 2540-9, p. 18
Medical Information Technologist	Colleges, OTJ	Health Technologists, Technicians, and Health Care Support Occupations. Reprinted from the Occupational Outlook Handbook, 2002-2003 Edition. U.S. Department of Labor, Bureau of Labor Statistics. February 2002, Bulletin 2540-9, p. 18
Public Health Educator	Colleges and Universities	http://www.asph.org/aa_section.cfm/151
Reimbursement Specialist (HFMA)	Colleges, OTJ	Health Technologists, Technicians, and Health Care Support Occupations. Reprinted from the Occupational Outlook Handbook, 2002-2003 Edition. U.S. Department of Labor, Bureau of Labor Statistics. February 2002, Bulletin 2540-9, p. 18
Social Worker	Colleges and Universities	Simmers, Louise, M.Ed., R.N. Diversified Health Occupations 5th Edition, Delmar Thomson Learning, New York 2001, p. 36

Transcriptionist	Voc-Tech Programs, Colleges, Medical Assistants	Health Technologists, Technicians, and Health Care Support Occupations. Reprinted from the Occupational Outlook Handbook, 2002-2003 Edition. U.S. Department of Labor, Bureau of Labor Statistics. February 2002, Bulletin 2540-9, p. 20 (Medical Assistant added)
Unit Coordinator	Voc-Tech Programs, OTJ	Simmers, Louise, M.Ed., R.N. Diversified Health Occupations 5th Edition, Delmar Thomson Learning, New York 2001, p. 31
Utilization Manager (see also Medical and Health Services Manager)	Colleges and Universities	http://stats.bls.gov/oco/ocos014.htm
Support Services Careers		
Biomedical Clinical Engineer	Colleges and Universities	Occupational Outlook Handbook, O*NET 17-2031.00
Central Services	OTJ, HOE Program	Simmers, Louise, M.Ed., R.N. Diversified Health Occupations 5th Edition, Delmar Thomson Learning, New York 2001, p. 33
Environmental Services	OTJ, Voc-Tech Program	Simmers, Louise, M.Ed., R.N. Diversified Health Occupations 5th Edition, Delmar Thomson Learning, New York 2001, p. 33
Facilities Manager (see also Medical and Health Services Manager)	Colleges and Universities	http://stats.bls.gov/oco/ocos014.htm
Food Service	Managers – Colleges and Universities Workers - OTJ	http://stats.bls.gov/oco/text/ocos024.txt
Industrial Hygienist	Colleges, Universities, and OTJ	Health Technologists, Technicians, and Health Care Support Occupations. Reprinted from the Occupational Outlook Handbook, 2002-2003 Edition. U.S. Department of Labor, Bureau of Labor Statistics. February 2002, Bulletin 2540-9, p. 26
Materials Management	Colleges and Universities	http://stats.bls.gov/oco/ocos023.txt

Biotechnology Research and Development Careers (Please note – many of the Biotechnology careers are scientists with different areas of focus and specialization).		
Biochemist	Colleges and Universities	http://stats.bls.gov/oco/text/ocos047.txt
Bioinformatics Associate	Colleges and Universities	http://www.bioplanet.com/education/htm
Bioinformatics Specialist	Colleges and Universities	http://www.bioplanet.com/education/htm
Biomedical Chemist	Colleges and Universities	http://stats.bls.gov/oco/text/ocos047.txt
Biostatistician (see also statistician)	Colleges and Universities	Occupational Outlook Handbook, O*NET 15-2041.00
Cell Biologist	Colleges and Universities	http://stats.bls.gov/oco/text/ocos047.txt
Geneticist	Colleges and Universities	http://stats.bls.gov/oco/text/ocos047.txt
Lab Technician	Colleges, Universities, Hospitals, Voc-Tech Programs, Military	Health Technologists, Technicians, and Health Care Support Occupations. Reprinted from the Occupational Outlook Handbook, 2002-2003 Edition. U.S. Department of Labor, Bureau of Labor Statistics. February 2002, Bulletin 2540-9, p. 5
Microbiologist	Colleges and Universities	http://stats.bls.gov/oco/text/ocos047.txt
Molecular Biologist	Colleges and Universities	http://stats.bls.gov/oco/text/ocos047.txt
Pharmaceutical Scientist	Colleges and Universities	http://stats.bls.gov/oco/text/ocos047.txt
Quality Assurance Technician	Colleges	http://www.tc.cc.va.us/programs/ot/eit/qualassu.htm
Regulatory Affairs Scientist	Colleges and Universities	http://stats.bls.gov/oco/text/ocos047.txt
Research Assistant	Colleges and Universities	http://stats.bls.gov/oco/text/ocos047.txt
Research Associate	Colleges and Universities	http://stats.bls.gov/oco/text/ocos047.txt
Research Scientist	Colleges and Universities	http://stats.bls.gov/oco/text/ocos047.txt
Toxicologist	Colleges and Universities	http://stats.bls.gov/oco/text/ocos047.txt

Section VII – Validation Overview/ Results

HEALTH SCIENCE CAREER CLUSTER OVERVIEW & VALIDATION
From National Skill Standards to Certification

National Health Care Skill Standards Become a Reality
The National Health Care Skill Standards (NHCSS) were officially introduced at a Washington, D.C. reception on September 14, 1995. Fueled by the realization that America's students were not performing equally on international assessments with other developing countries, it was realized that standards must be set that give students a bar against which to measure their preparation for entry into the workforce.

A unique partnership between the U.S. Department of Education, the U.S. Department of Labor and the National Skills Standards Board funded 22 pilot projects representing different industry sectors. Health Care was one of the sectors to receive funding. The award was given to [1]WestEd in partnership with the [2]National Consortium on Health Science and Technology Education (NCHSTE).

Led by a Policy Advisory Committee, more than 1,000 individuals representing a combined 100 health care organizations and education institutions participated in the development, review and pilot testing of the standards. Standards have been developed and validated for foundation skills that span the health science career cluster. The Health Care Skill Standards offer an answer to the question "What does a healthcare employee need to know and be able to do to contribute to the delivery of safe and effective health care?" Health Care Skill Standards represent common expectations most workers need in order to succeed in a job and a career.

Foundation Standards by title:

- Academic Foundation
- Communications
- Systems
- Employability Skills
- Legal Responsibilities
- Ethics
- Safety Practices
- Teamwork
- Health Maintenance Practices
- *Technical Skills
- *Information Technology Applications

*These standards were later added by the USDE

The standards, by title, seem common across all industry sectors. However, further investigation reveals uniqueness to the standards within the various industries. The sample shows the unique communication features for those seeking a career in health care.

Sample Standard:
Communications
Health Care workers will know the various methods of giving and obtaining information. They will communicate effectively, both orally and in writing.

[1] WestEd is one of 10 regional laboratories funded by the U.S. Department of Education. Each has an area of specialization. WestEd has been charged with providing research for assessment and evaluation.
[2] NCHSTE is a consortium of health care industry, professional and state level secondary and postsecondary education representatives whose mission is "…to shape and influence the preparation and employment of the health care workforce".

Benefits of having nationally validated Health Care Skill Standards include a potential for forging strong links among the various stakeholders within this career cluster. National standards provide a common language, common goals and a common reference point for employers, workers, students, labor, educators and consumers.

In addition, career pathway standards have been developed. Grouped by health care [3]functions; diagnostic services, therapeutic services, support services, health informatics and biotechnology research and development; these standards provide the next step in the career preparation learning continuum that leads to specialization and career entry.

Careers that are high employing or have high employment potential have been identified and are displayed on a career specific chart for those wishing more information on the groupings. In addition a matrix showing academic and certification/licensure requirements for each of the careers listed on the chart is available to assist students with career selection and program planning.

Setting the Bar Summit Defines Accountability Criteria

Once all of the standards were in place and validated by field test it became evident that further delineation was needed. NCHSTE in partnership with the Utah State Office of Education was the recipient of one of the National Building Linkages grants. These projects collaboratively sponsored by the U.S. Department of Education, the National Skills Standards Board and the National School-to-Work Office were designed to build learning continuums that span the grade levels beginning in elementary school and culminating with professional preparation at a college or university. This project provided resources for developing the accountability criteria for each of the standards.

A "Setting the Bar" Summit was held with individuals across the country from colleges, universities, secondary schools, professional and employer groups. These experts were asked to determine the criteria for measuring each foundation standard. Too often students are expected to demonstrate skills and knowledge within the skill standards areas, but little detail is offered on the level. Educators wanted to know "how good is good enough" to meet those expectations?"

Sample Standard: Communications
Accountability Criteria
Oral Communication Skills

- Adjust communication to other's ability to understand
- Apply the elements of communication using the sender-receiver model
- Apply active listening skills using reflection, restatement and clarification techniques
- Demonstrate courtesy to others including self introduction
- Interpret verbal and non-verbal behaviors to augment communication and within scope of practice
- Demonstrate interviewing skills

The accountability criteria that resulted from the Summit "set the bar", providing the answer to the question asked and at the same time created guidelines for curriculum design and student assessment. The accountability criteria also informs postsecondary faculty and health care employers as to what can be expected of students completing foundation standards preparation. The accountability criteria were validated by school-based teams from the 17 states that were members of NCHSTE at the time of standards development.

[3] The determination of the method for organizing the career pathways was the result of a lengthy and contentious debate. Many supported the idea of occupationally specific career paths, such as, nursing or pharmacy, while others saw no need for this interim set of standards. After much discussion it was agreed that the skills and knowledge needed for careers within this broad and diverse industry would be grouped by functions.

Career Path: Biotechnology Research & Development
Standard: Academic Foundations
Accountability Criteria
Genetics

- Describe the basic structure of a chromosome
- Construct a karyotype with human chromosomes
- Differentiate the genetic inheritance of a lethal dominant homozygous trait from a heterozygous disease

A second "Setting the Bar" Summit was held that included representatives from a number of health care professional organizations and postsecondary faculty. The attendees at this summit were responsible for developing accountability criteria for the career pathway standards. 10 school-based teams from five NCHSTE member states volunteering to participate in the process validated these accountability criteria.

Assessment and Certification

With the validated Health Care Foundation Skill Standards in place and the accountability criteria identified, the assessment process was ready to begin. Test item developers from five of the NCHSTE member states were invited to submit test items for each of the accountability criteria. The items were reviewed for bias and authenticity and organized into three tests of 100 questions each for pilot testing at the 2001 National Health Occupations Students of America (HOSA) Leadership Conference. A total of 518 students representing 24 states participated in the pilot test.

The pilot test results will help the test developers make revisions as indicated by the responses. The survey revealed that 44% of the students were familiar with the National Health Care Skill Standards, 77% thought their curriculum was aligned with the standards and 49% felt the test should be added as a HOSA skill event. Test takers were also asked if they thought a Certificate of Achievement would add value to the test. Responses indicated that 52% believed it would, 22% believed it would not and 26% were unsure. Fifty percent of the students agreed they would be willing to pay a $20 fee to take the test.

A second field test was completed during the spring of 2002, with 2,736 volunteers participating through an Internet accessible version of the exam. Results are being tabulated for further item refinement. Conversations with several testing companies are ongoing. Selection of a vendor should be completed by early fall 2002. Criteria for selection will include: Internet access, immediate results for the test taker, item analysis available for the instructor and a matrix sampling item selection process.

In addition to scenario based multiple-choice items, a portfolio of student work will be required for certification. The portfolio will include such items as a resume, job application, a writing sample, service learning/community service project description and a work-place learning experience validation. The portfolio will be verified and maintained by the instructor. The testing company and NCHSTE will endorse the certificate.

The pilot tests revealed that of the 11 foundation standards tested the weakest area is the Systems Standard. In order to assist teachers with the content and application, a Systems expert was contracted to develop a self-contained module on the topic. The Systems module is available on CD. Those that have purchased the CD have been extremely pleased with the format and content.

Standards-based Instruction
As part of the Health Science Building Linkages project, NCHSTE also developed more than 175 activities spanning grades K-12. These activities integrate the health science foundation skill standards into academic and career technical education coursework. The activities help students gain the skills and knowledge needed to successfully complete the certification as well as skills needed for making wise career choices.

Each activity is organized by grade span:

- K-3
- 4-6
- 7-8
- 9-12

They are also organized by academic subject:

- English-Language Arts
- Mathematics
- Science
- History-Social Science
- Health Education
- Physical Education
- Health Science

Each activity includes identification of the primary and secondary academic connection and identification of the specific academic and health care foundation standard(s) that are addressed. For ease of use, notes on the role of the teacher, education partner(s), industry partner(s) as well as assessment strategies and recommended resources are included. For more information and resources on the topics links to web sites are highlighted.

The development process was extensive with teams from 17 states participating in the development and pilot testing of the activities. Once the first draft was completed a team of two from each of the 17 states was trained to be coaches at a three-day interactive case-study event. Each coach was then assigned to guide the pilot test of two learning partnerships that included elementary, middle and high schools, a community college and/or university and appropriate industry partners. Following the field test, a de-briefing session was held for the coaches where results were reviewed and activities revised as recommended by the pilot teams.

One recommendation was to strengthen the rigor and complexity of activities supporting math and science standards at the high school level. To accomplish this task high school science (chemistry, physics, biology) and math (geometry, algebra, calculus) faculty were teamed with University of California and California State University faculty from the schools of nursing, pharmacy, medicine, radiology and physical therapy. Several health care professionals joined the educators and 15 additional highly rigorous activities were completed and added to the model.

The Health Science Building Linkages Model activities have been distributed through professional development to more than 30 states including Alaska and Hawaii. The distribution has included both inservice sessions for health science and health careers faculty and industry representatives as well as train the trainer sessions for those that wish to take on this responsibility. Teachers have been very enthusiastic about the ease of implementation and student response. New activities will be added as available.

For More Information or to Order Products and Services Contact:

NCHSTE •2410 Woodlake Drive• Suite 440• Okemos, MI 48864
Phone: (517) 347-3332• Fax: (517) 347-4096• www.nchste.org

Section VIII – Assessment Protocol
Certification Protocol

Deliverable #7
Title: Protocol for Career Clusters Assessment
8/5/2002 4:00 PM

Definition of Career Clusters Assessment

Assessment, within the context of the Career Clusters Initiative, is defined as *a **measurement** of what a learner should know and be able to do*. The academic and technical knowledge and skills common to all occupations and pathways within a single cluster are initially addressed in the Career Clusters Initiative. Each cluster measures or assesses a learner's knowledge and skills related to the cluster.

Purpose of the Protocol for Career Clusters Assessments

The purpose of this document is to provide:

- Minimum criteria for selecting existing assessment instruments that align to the academic and technical knowledge and skills identified for each cluster.
- Minimum criteria for developing new assessment instruments that align to the academic and technical knowledge and skills identified for each cluster.
- Minimum criteria for validating and determining reliability of assessment instruments.

Functions of Career Clusters Assessment

Career Cluster Assessment serves to

- *measure* (assess) *student achievement*, both cognitive and performance, in areas of academic and technical knowledge and skills for each cluster
- *provide the basis* for a transportable, industry-endorsed certification.

Operational Guidelines for Career Clusters Assessment

This protocol includes minimum criteria/expectations career cluster designers need to apply in the selection/development of assessment modalities. Career clusters assessment:

CONTENT

- measures all 10 Foundation knowledge and skills.
- customizes context of questions and applications to individual clusters.
- reflects a high degree of specificity of measurable knowledge and skills.
- aligns to academic standards.
- connects to post high school standards and competencies.
- is consistent with Perkins data-quality criteria.

FORM

- combines a minimum of two modalities: cognitive and performance.
- includes an item bank that can accommodate multiple applications.
- reflects quality design and clear formats.

APPLICATIONS AND USES

- offers diagnostic feedback to the learner.
- provides added value to the user (employer, post high school); not required for employment.
- affords portability of results.
- provides cues for instruction.

ADMINISTRATION

- validates identity of test takers through a secure system.
- affords flexible administration, e.g. single assessment per foundation cluster topic or combination of topics.
- provides flexible timing for administration.
- affords no cost or low cost to students.
- includes an affordable, user-friendly process to cover administrative costs.
- reflects an administration process that is as consistent as possible with other career cluster assessments.
- includes an affordable, user-friendly maintenance process.

VALIDITY AND RELIABILITY

- uses consistent, reliable, and technically strong elements.
- is recognized by business and industry.
- is recognized by post high school education and training.

Deliverable #8
Title: Protocol for Career Clusters Certification
8/23/2002 2:28 PM

Definition of Career Clusters Certification

Certification, within the context of the States' Career Clusters Initiative, *documents* learner achievement of the academic and technical knowledge and skills common to all pathways and occupations within a cluster. It is based on valid and reliable assessments. A certificate is recognized by employers, secondary education, and post high school education as "value added to the admissions process to further education, immediate employment process, and/or to employment advancement".

Purposes of the Protocol for Careers Cluster Certification

The purposes of this document are to provide:

- Minimum criteria for selecting existing certification programs that align to the academic and technical knowledge and skills identified for each cluster.
- Minimum criteria for developing new certification programs that align to the academic and technical knowledge and skills identified for each cluster.
- Minimum criteria for determining the value of a certification program.

Functions of Career Clusters Certification

Career Cluster Certification serves to provide a consistent, transportable method of documenting learner achievement of a Career Cluster's validated academic and technical knowledge and skills. The system is based on valid and reliable assessments.

Operational Guidelines for Career Clusters Certification

This protocol includes minimum criteria/expectations career cluster designers need to apply in the selection/development of certification processes. Career clusters certification:

- Defines the purpose and scope of the certificate.
- Bases issue of the certificate on assessed learner proficiencies and competencies related to a Career Cluster's validated academic and technical knowledge and skills.
- Requires learner to meet the assessment benchmark identified.
- Informs the public concerning the knowledge and skills of the certificate holder.
- Indicates date of issue on the certificate.
- Issues certificate from the State (State Director of Career-Technical Education or appropriate designee) if the issuing organization is a secondary or post secondary education institution.
- Issues certificate from the CEO (or an appropriate designee) of an issuing professional organization/agency/institution/company.
- Requires issuing organization to maintain a database (state and/or national) of certificate holders based on the respective term of renewal.

National Association of State Directors
of Career Technical Education Consortium

www.careerclusters.org

Revised June 2003